Riverine and Combatant Craft Operations Facility

at

Stennis Space Center, Mississippi

(P-210)

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PART 1

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PART 2

GENERAL REQUIREMENTS

01006N POST AWARD MEETINGS

01141N WORK RESTRICTIONS FOR DESIGN-BUILD

01151N SPECIAL PROJECT PROCEDURES FOR DESIGN-BUILD

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01575N TEMPORARY ENVIRONMENTAL CONTROLS

01670 RECYCLED/RECOVERED MATERIALS

01782N FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION

SECTION 01006N

POST AWARD MEETINGS
02/06

PART 1 GENERAL

1.1 SUMMARY

This document includes post-award requirements for project kickoff and subsequent design and preconstruction meetings.

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

CDW Facilitator Experience Resume; G

CDW Preliminary Concept Design; G

CDW Basis of Design with Cost Estimate; G

CDW Concept Design Report; G

1.3 POST AWARD KICKOFF MEETING

The Post Award Kickoff (PAK) meeting is made up of Contract Administration, Design Presentation, Partnering, and Scheduling. If mutually beneficial to the Contractor and the Government, these four elements may be addressed in a single meeting or multiple meetings. Additionally, the Contractor may conduct the Concept Design Workshop (CDW) in conjunction with the PAK.

1.3.1 PAK Meeting Location

Within 21 calendar days after contract award, and prior to commencing work, meet with the Contracting Officer for the PAK meeting(s). The meeting shall be at a mutually agreed to time and location.

1.3.2 PAK Meeting Outcomes

The meeting(s) outcomes are:

a. Integrate the Contractor and all client representatives into the project team.

b. Achieve consensus from the project team on any issues and concerns with the Contractor's technical proposal.

c. Establish and explain policies and procedures for completion of a successful project.

d. Establish clear lines of communication and points of contact for Government and Contractor team members.

e. Obtain an acceptable conceptual design including floor and site plans signed by the client, Contractor, and other key team members.

f. Establish clear expectations for the Concept Design Workshop (CDW).

g. Establish project design schedule, design submittal packaging, and preliminary construction schedule.

h. Establish clear expectations for facility turnover.

i. Establish procedure for design package reviews, Contractor's resolution to comments, and Government's role in review of packages.

1.3.3 PAK Meeting Attendees

The following Contractor key personnel shall attend the PAK: Project Manager, Project Scheduler, Design Staff representing each architectural/engineering discipline, Superintendent, QC Manager, and DQC Manager. Optional attendees include: Principal, Assistant Project Manager, major subcontractors, and specialized supplemental QC personnel.

1.3.4 Contract Administration

Contract administration roles and responsibilities will be addressed.

1.3.5 Concept Design Workshop (CDW)

Provide as specified in Appendix 01006-1, Concept Design Workshop. Attendees shall be similar to those listed above for the PAK meeting.

1.3.6 Partnering Meeting

LEVEL A PARTNERING: The Contractor shall conduct quarterly partnering sessions with key personnel of the project team, including Contractor's personnel and government personnel. The Contractor shall pay all costs in connection with the partnering effort.

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership with the Contractor and its subcontractors. Key personnel, including the client who will occupy the facility, the Designer of Record, principal individuals from NAVFAC (Echelon III and/or IV) and from the ROICC office, the project sponsor, and representative(s) of the facility owner will be invited to participate in the partnering process. Key members of the prime and subcontractors teams, including senior management, must participate.

The initial session will be one-day minimum and the follow-on sessions, held at a minimum of once every three months or as agreed to by the partners, will be half-day minimum. The initial partnering session shall be held away from the project site at a location acceptable to the Contractor and to the Government; the follow-on sessions can be held at locations agreed to by the partners.

The Contractor shall pay all costs associated with the partnering effort including facilitator, meeting room and other incidental items. Before the partnering session, the Contractor shall coordinate with the facilitator requirements for incidental items (audio-visual equipment, two easels, flipchart paper, colored markers, note paper, pens/pencils, colored flash cards, etc.) and have these items available at the partnering session.

The Contractor will copy documents for distribution to all attendees. The facilitator must be acceptable to both the Contractor and the Government. The participants shall bear their own costs for meals, lodging, and transportation associated with partnering.

1.3.7 Scheduling Meeting

Provide in accordance with Section 01325N, NETWORK ANALYSIS SCHEDULES (NAS) FOR DESIGN-BUILD.

1.4 DESIGN QUALITY ASSURANCE MEETINGS

After Government Quality Assurance (QA) of each Design Submittal has been completed, meet with the Government for a one-day conference to discuss review comments for the specific design submittal.

Provide consolidated copies of all Government comments with annotations of Contractor's action beside them. Notify the Contracting Officer in writing within five (5) days after receipt of Government's comments if the Contractor disagrees with comments technically or interprets comments to exceed the requirements of the contract.

1.4.1 Design QA Meeting Attendees

The following Contractor key personnel shall attend the design QA meetings: Project Manager, QC Manager, DQC Manager, and Contractor's Design Staff (architect and engineering disciplines related to topics to be discussed).

1.4.2 Design QA Meeting Location

Meetings shall be located at the office of the Contracting Officer's QA Team or may be conducted at other locations or by other electronic means if mutually acceptable to all parties.

1.4.3 Minimum Design QA Meeting Agenda

Address all Government comments that are unresolved and present clarification or supporting information requested by the Contracting Officer's QA team during the previous meeting.

1.5 PRE-CONSTRUCTION MEETING

Meet with the Contracting Officer to discuss construction items of concern to the Government and the Contractor such as outages, storage, trailer location, disposal of construction debris, etc. at a location to be determined by the Contracting Officer. The pre-construction meeting may take place with the PAK meeting or at any time prior to mobilization and before any construction work begins.

1.6 FACILITY TURNOVER PLANNING MEETINGS (NAVFAC RED ZONE – NRZ)

Key personnel will meet to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start the turnover process at the PAK Meeting and convene the Facility Turnover Meetings once the project has reached approximately 75% completion or three to six months prior to Beneficial Occupancy (BOD), whichever comes first. The Contracting Officer's Representative will lead the meetings and guide the discussions based on an agenda provided by the Government. The Facility Turnover effort shall include the following:

a. PAK Meeting – Contracting Officer's Technical Representative (COTR) will provide the NRZ Checklist (a preliminary copy is included in Appendix 01006-2, NRZ Checklist), and the Contractor, Client, and NAVFAC Representatives will compare Contractor's schedule to NRZ Checklist to ensure all Contractor Checklist Items are included in the schedule and to discuss the scheduling impact of Client and NAVFAC Checklist Items.

b. Facility Turnover Meetings -

1. Fill in the NRZ Checklist including Contractor, Client, and NAVFAC Checklist Items and assign a person to be responsible for each item and a due date. The Contracting Officer's Representative will facilitate the assignment of responsibilities and fill out the NRZ Checklist.

2. Review the Contractor's updated schedule. The Contracting Officer's Representative shall develop a POAM for the completion of all Contractor, Client, and NAVFAC Checklist items.

3. Confirm that all NRZ Checklist items will be completed on time for the scheduled Facility Turnover.

1.6.1 Facility Turnover Meeting Attendees

The following key personnel shall attend the Facility Turnover Meetings: Contractor QC Manager, Design Quality Control Manager, Superintendent, Major Subcontractors, Designer-of-Record, Contracting Officer's Representative, Representative(s) of NAVFAC, the Facility Owner, and the Client.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

- End of Section –

Appendix 01006-1
CONCEPT DESIGN WORKSHOP (CDW)

Provide the following information:

a. CDW Facilitator Experience Resume
b. CDW Preliminary Concept Design
c. CDW Basis of Design with Cost Estimate
d. CDW Concept Design Report

1. General

1.1 Methodology. A Concept Design Workshop will be conducted for this project. This effort will examine project functions and requirements, quality and life safety costs, analyze alternate design concepts, expose and resolve project issues, and develop the final conceptual design.

1.2 Facilitator. The Contractor will provide a Facilitator who is experienced in conducting Concept Design Workshops. He or she will be responsible for leading the team in a timely manner, making sure that issues are pursued and resolved to the maximum extent possible, documenting meetings, organizing the design concept documents for on-site approval, and providing the Concept Design Workshop Report.

1.3 Contractor's Design Team. The primary functions of the Design Team will be to investigate, develop and present alternate design solutions. The entire Design Team will participate in all phases of the Concept Design Workshop effort and provide assistance to the Facilitator in development of the Concept Design Workshop Report, including most of the required documentation.

1.4 Concept Design Workshop Report. Produced almost entirely on-site, the Concept Design Workshop Report will summarize the final conceptual design.

1.5 Award Amount. At each contract stage, the Contractor shall verify that the concept is within the contract award amount.

2. Procedure

2.1 Preliminary Work. The Contractor's Design Team shall complete the following prior to the on-site workshop:

a. Review the contract documents and references explaining the project scope and history.

b. At the Post Award Kickoff meeting, the User(s) makes a presentation of their functional requirements.

c. Prepare and submit, at least 7 days in advance of the Concept Design Workshop, 15 copies of a preliminary concept design (Concept #1), a Basis of Design, and a statement that the concept provided is within the award amount.

d. Make arrangements for and provide an appropriate conference room convenient to the project site and/or Users for use by the Design Team and government participants during the workshop.

e. Incorporate government comments in a revised Concept #1 and produce at least 20 copies of the revised Concept #1 documents for distribution at the workshop.

f. Facilitator has discussions with NAVFAC representatives before the Concept Design Workshop to review preparations, relationships, and the status of work to be accomplished.

2.2 On-Site Workshop. The Design Team shall accomplish the following items during the on-site phase of the Concept Design Workshop. (Typically conducted in two to three working days, minimizing breaks so as to maintain momentum. The Design Team should expect longer than normal workdays.)

a. At the beginning of the workshop, meet with the using activity, Station and other Government representatives. The Facilitator will describe the Concept Design Workshop process and review the workshop agenda. The user(s) will provide a functional presentation. This is to reiterate to all participants the User(s) needs and desires. The intent is to make the design solution and issue resolution function-oriented.

b. Present the revised Concept #1 and respond to questions.

c. Participate in a comment/creative session to generate ideas to improve this project in the areas of function, quality and total life cycle cost, issue resolution and sustainable design within the award amount. It is often helpful to request User comments in writing so they may be considered, responded to, and presented at subsequent presentations.

d. Create a new concept design. Design concepts shall include drawings, sketches, and other graphics as necessary to fully describe the concept. Prepare at least 20 copies for distribution at all presentations.

e. Repeat applicable steps as necessary. Usually, at least two concepts are required. The final concept must be within the contract award amount.

f. The final concept shall include the following:

(1) Site Plan: Show the layout of the proposed facility in relation to major landmarks. Show all buildings, access roads, parking, pedestrian walkways, roads, sidewalks, landscaping, and major utilities. Indicate major dimensions and orientation. Provide a building code analysis, relating the proposed building site, size, and construction type to maximum allowable limits of the International Building Code.

(2) Building Floor Plans: Provide floor plans depicting functional utilization of spaces and furniture and equipment layout. Show room sizes or dimensions. Provide a Life Safety

Code® analysis with the floor plan to identify required life safety and egress features.

(3) Perspective Sketches: Provide at least one sketch to show a perspective of major buildings. The sketch should not be elaborate but must show the proposed form and massing, colors to be used, and an indication of materials used.

(4) Mechanical Plans: Provide plans as necessary to show the essential work and intent of the design. Suggestions include equipment layouts, zones, etc.

(5) Electrical Plans: Provide plans as necessary to show the essential work and intent of the design. Suggestions include special light fixture types, locations, switching, power outlets and panelboard location. Provide electrical distribution single line diagram.

(6) Cost Estimate: Provide a statement that the concept presented can be constructed within the award amount.

(7) Basis of Design: Describe, in layman's terms, the intent of the design by discipline. Address material quality, energy efficiency and life cycle costs.

(8) Sustainable Design: Demonstrate ability to achieve LEED self-certification.

(9) System Safety Engineering

g. Prepare 20 copies of the final concept (drawings, basis of design and statement that the concept is within the award amount) for distribution at the final presentation.

h. Dependent upon the project, the Concept Design Workshop Report is provided by the Facilitator, includes all items included in the final concept design and the following:

(1) Endorsements: Include a copy of the signature/endorsement sheet.

(2) Comments: Include comments and resolutions concerning the final concept design.

(3) Executive Summary: Summarize the workshop, including how the various concepts differed and were improved during the workshop.

(4) Special Design Features: Identify and describe unique project needs and features, e.g., pile foundations, physical security, intrusion detection systems, access control, construction in humid climates, pollution abatement, tempest, HEMP, etc.

(5) Architectural Compatibility Statement: Identify architectural style, materials, and color scheme; and indicate their compatibility with installation planning and design concepts established in the Base Exterior Architectural Plan.

(6) Environmental Summary: Provide a summary of environmental issues, listing completed actions and items requiring further coordination, waivers or permits.

(7) Supporting Project Documentation: Include data to support the development of the concept design, layout, and special features. Items should include: project scope discussion, minutes of meetings, function analysis work sheets, and economic and technical analyses if alternatives evaluated.

i. Except for final comments, responses and endorsements, the final report should be completed on site, before the final presentation. If requested by the NAVFAC Project Manager, be prepared to present up to 10 hard copies of the report at the conclusion of the workshop.

j. Conduct a "front-to-back" comprehensive presentation of the final concept. Obtain user signatures on a conceptual design endorsement sheet, signifying approval of the concept design, subject to the final comments and their resolutions agreed to at the final presentation meeting.

2.3 Concept Design Workshop Report

Within 14 calendar days of completion of the on-site Concept Design Workshop, the Design Team shall submit to the NAVFAC Project Manager an electronic copy of the Concept Design Workshop Report as one file in *.PDF format.

NRZ Checklist/POAM Items

The tables below provide typical NRZ checklist items for contractor, Client, and NAVFAC actions (Tables 1, 2, and 3, respectively). Items listed on the checklists are required to remain on the checklists if they are part of the project/contract or required by construction convention. Items not listed on the checklists, but required in the contract or by construction convention, must be added to the checklists by the contractor, Client and NAVFAC. Checklists are applicable to all contracts no matter what Category of Work.

The Point of Contact and due date shall initially be determined during the Facility Turnover Planning Meeting by the NAVFAC, client and contractor leads. During execution of the NRZ process, for each item on the entire list, the Construction Manager (CM) shall indicate date completed and initial to indicate completion of the item. If a party fails to complete an item by the due date, this should be noted on the checklist and new due date established and indicated. The completed NRZ Checklist/POAM shall be placed in the contract file.

Table 1

Contractor Checklist Items	Point of Contact	Due Date	Actual Complete Date	CM Initials	Notes
a. Construction Completion Schedule					
b. Facility Delivery Closeout:					
Duct Air Leakage Testing					
HVAC System Test & Balance					
ACATS Controls Testing					
Conduct Second Seasons TAB					
Electrical Systems Testing					
Final Utility Systems Connections (power, water, etc.)					
Superchlorination of Potable Water Systems					
Plumbing / Other Mechanical Testing					
Elevator Certification(s)					
Specialized Equipment & Systems Inspections (Boilers, UPV, etc.)					

Contractor Checklist Items	Point of Contact	Due Date	Actual Complete Date	CM Initials	Notes
Fire Protection Systems Inspections and Performance Verification					
Communications / IT Systems Testing					
Security Systems Testing					
Other Specified Building Performance Requirements					
c. Other Contractor Items:					
Delivery of O&M Manuals					
Delivery of Equipment/Product Warranty List/Tag					
O&M/OMSI Training of Navy Personnel					
Site Restoration, if applicable					
Landscaping Complete					
Pre-Final Inspection					
Final Inspection and Acceptance					
Delivery of Spare Parts, Extra Stock, Special Tools, etc					
Delivery of As-Built Drawings					
Delivery of Utility Record Drawings (if applicable)					
Delivery of Utility As-Built Drawings (if applicable)					
Beneficial Occupancy Date (BOD)					
Final Demobilization and Clean-up Completed					
Remove Construction Fence & Associated Coordination					
Pre-warranty Conference					
Project Close-out Meeting					
Coordination and Delivery of Facility Signage					
Final Cleaning					
Replace Construction Lock Cores and Re-keying					
Punch List Completion					
Provide DD1354 to Government CM					

Table 2

Client Checklist Items	Point of Contact	Due Date	Actual Complete Date	CM Initials	Notes
Modification to FSC or BOSC to maintain/service new facility -Telephone service contract -Utilities service contract -Custodial service contract					
Installation of communications for phones and computers					
NMCI Installations or other networks					
Delivery and installation of client furnished furniture					
Delivery and installation of client furnished equipment					
User move-in					
GFE status/delivery schedule (GFCI, GFGI)					
Coordination of Intrusion Detection Systems and Physical Security Equipment					
Process operating permits					
Recycled/recovered materials report					
Coordination of IT and Communication Infrastructure and Devices (incl. CAT IV)					
Ribbon-cutting ceremony					

Table 3

NAVFAC Checklist Items	Point of Contact	Due Date	Actual Complete Date	CM Initials	Notes
Client walk-thru prior to pre-final inspections, if appropriate					
Schedule client satisfaction post BOD follow-up					
Schedule Government inspections of specialized equipment (e.g., Boiler/pressure vessels, elevators, UPS, SCIF shielding requirements, medical certifications, generators/switchgear)					
Provide keying plan to contractor					
Confirm utilities availability for final connections by contractor					
Startup utilities					
Mechanical Acceptance					
Resolve contract modifications & requests for equitable adjustment					
Contractor final release					
Return unobligated funds					
Process final payment					
Process recycled/recovered materials report					
Closeout actions on construction permits (e.g., NPDES)					
A-E and Construction Contractor Evaluations (ACASS/CCASS)					
Contractor QC Evaluation					
Complete Installed Property List and DD 1354					
Sign & provide Interim DD1354 to activity Real Property Accountability Officer NLT BOD					

SECTION 01141N

WORK RESTRICTIONS FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

List of contact personnel; G

1.2 SPECIAL SCHEDULING REQUIREMENTS

a. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work.

b. The adjacent buildings, roads, and other facilities shall remain in operation during the entire construction period. Conduct operations so as to cause the least possible interference with normal operations of the activity.

c. Permission to interrupt any Activity roads and/or utility service shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.

d. The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operations. Identify on the construction schedule each factor which constitutes a potential interruption to operations.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

See additional requirements established in Section 01571N, ADDITIONAL TEMPORARY CONTROLS.

1.3.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. To minimize traffic congestion, delivery of materials shall be outside of peak traffic hours (6:30 to 8:00 a.m. and 3:30 to 5:00 p.m.) unless otherwise approved by the Contracting Officer. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.3.1.1 Subcontractors and Personnel Contacts

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.1.2 Identification Badges

Identification badges will be furnished without charge. Application for and use of badges shall be as directed by the Contracting Officer. Contractor shall immediately report all instances of lost or stolen badges to the Contracting Officer and Stennis Space Center (SSC) Security. Identification badges will be issued to all Contractor and subcontractor employees in accordance with SSC Security regulations. A copy of these regulations may be obtained from SSC Security. All badges must be returned to SSC Security upon expiration of the badge or contract or termination of the employee.

1.3.2 Working Hours

Regular working hours can consist of up to a 9 1/2 hour period between 7:00 a.m. and 4:30 p.m., Monday through Friday, excluding Government holidays.

1.3.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government, giving the specific dates, hours, location, type of work to be performed, contract number, and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

1.3.4 Occupied and Existing Buildings

The Contractor shall be working around existing buildings which are occupied. Do not enter the buildings without prior approval of the Contracting Officer.

1.3.5 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."

b. Ensure that new utility lines are complete in all regards (including all required testing, except for the actual connection) before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, data communications, air conditioning, heating, fire alarm, and compressed air shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours." Such interruption shall be limited to 8 hours. This includes time for deactivation and reactivation.

d. Operation of Installation Utilities: The Contractor shall not operate nor disturb the setting of control devices in the installation utilities system, including water, sewer, electrical, and communication services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.3.5.1 Location of Underground Utilities

The Contractor is responsible for locating and marking all underground utilities. Prior to starting work, scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities or utilities encased in pier structures are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated or specified to be removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

a. Notification Prior to Excavation: Notify the Contracting Officer at least 7 days prior to starting excavation work. Contact Miss Utility 48 hours prior to excavating. Contractor is responsible for marking all utilities not marked by Miss Utility.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01151N

SPECIAL PROJECT PROCEDURES FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N DESIGN SUBMITTAL PROCEDURES and Section 01332N CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Watercraft list; G

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 HARBOR WATERWAYS

In addition to "DFARS 252.236-7002, Obstruction of Navigable Waterways," obtain from the Contracting Officer, permission to use waterways and the regulations and directives governing such usage. Submit a watercraft list with a description of crafts, including sizes, types, numbers and boat crew for approval.

3.1.1 Hazards to Navigation

Maintain complete control of the movement of floating equipment and material. Loose floating equipment and material are not permitted. Keep in readiness at all times a powered craft capable of moving, securing and disposing of floating equipment which may get loose and become a hazard to navigation.

-- End of Section --

SECTION 01201N

PRICE AND PAYMENT PROCEDURES FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP-1110-1-8	(2003) Construction Equipment Ownership and Operating Expense Schedule, Vol 1-12

1.2 SCHEDULE

1.2.1 Schedule Instructions

Payments will not be made until the Network Analysis System (NAS) has been submitted to and accepted by the Contracting Officer. Identify the cost for site work, and include incidental work to the 5 foot line. Identify costs for the building(s), and include work out to the 5 foot line. Work out to the 5 foot line shall include construction encompassed within a theoretical line 5 feet from the face of exterior walls and shall include attendant construction, such as cooling towers, placed beyond the 5-foot line.

1.2.2 Schedule Requirements for HVAC TAB

The field work required by Contractor edited Section 23 08 00.00 20, HVAC TESTING/ ADJUSTING/BALANCING shall be broken down in the NAS by separate line items which reflect measurable deliverables. Specific payment percentages for each line item shall be determined on a case-by-case basis for each contract. The line items shall be as follows:

a. Approval of Design Review Report

b. Approval of the pre-field engineering report

c. Season I field work

d. Approval of Season I report

e. Completion of Season I field QA check

f. Approval of Season II report

1.3 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting

records, equipment use rates shall be based upon the applicable provisions of the EP-1110-1-8.

1.4 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.4.1 Content of Invoice

Requests for payment will be processed in accordance with the Contract Clause "FAR 52.232-27, Prompt Payment Construction Contracts," and shall include items required by FAR 52.232-5, "Payments under Fixed-Price Construction Contracts" and the following:

a. The Contractor's invoice certified by QC, on the form furnished by the Government for this purpose, showing in summary form, the basis for arriving at the amount of the invoice. Submit original and five copies.

b. The Contract Performance Statement on the form furnished by the Government for this purpose, showing in detail, the estimated cost, percentage of completion, and value of completed performance for each of the construction categories. Submit original and two copies.

c. Final invoice shall be accompanied by Final Release Form. If the Contractor is incorporated, the release shall contain the corporate seal. An officer of the corporation shall sign the release and the corporate secretary shall certify the release.

d. Updated network mathematical analysis (three copies).

e. Contractor Safety Self Evaluation Checklist (original).

f. Monthly Work-Hour Report.

g. Solid Waste Disposal Report.

1.4.2 Mailing of Invoices

a. All invoices shall be forwarded with specific marking on the envelope. This marking shall be in the front lower left hand corner, in large letters, "INVOICES ENCLOSED."

b. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.

c. Final invoices not accompanied by Final Release Form will be considered incomplete and will be returned to the Contractor.

1.5 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01311N

ADMINISTRATIVE REQUIREMENTS FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

15 CFR 772	Definition of Terms
15 CFR 773	Special Licensing Procedures

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Insurance; G

1.3 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

a. Comprehensive general liability: $500,000 per occurrence.

b. Automobile liability: $200,000 per person, $500,000 per occurrence for bodily injury, $20,000 per occurrence for property damage.

c. Workmen's compensation as required by Federal and state workers' compensation and occupational disease laws.

d. Employer's liability coverage of $100,000, except in states where workers compensation may not be written by private carriers.

e. Others as required by the state.

1.4 CONTRACTOR PERSONNEL REQUIREMENTS

1.4.1 Subcontractor Special Requirements

1.4.1.1 HVAC TAB

All contract requirements of the Contractor edited Section 23 08 00.00 20, HVAC TESTING/ADJUSTING/ BALANCING shall be accomplished directly by a first tier subcontractor. No work required by Section 23 08 00.00 20 shall be accomplished by a second tier subcontractor.

1.5 SUPERVISION

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in the English language on the job site during working hours. In addition, the Quality Control (QC) representative shall also have fluent English communication skills.

1.6 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files will be made available to the Contractor for use in preparation of construction drawings and data related to the referenced contract subject to the following terms and conditions.

Data contained on these electronic files shall not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor shall make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor shall, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CADD drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. Use of these CADD files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

If the Contractor uses, duplicates and/or modifies these electronic CADD files for use in producing construction drawings and data related to this contract, all previous indicia of ownership (seals, logos, signatures, initials and dates) shall be removed.

1.7 CLEANUP

Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Replace filters of operating equipment. Clean debris from roofs, gutters, downspouts, and drainage systems. Sweep paved areas and rake clean landscaped areas.

Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01325N

NETWORK ANALYSIS SCHEDULES (NAS) FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 DESCRIPTION

The scheduling of all design, procurement, and construction shall be the responsibility of the Contractor. All design and construction increments will be interrelated on a single schedule that represents the entire project duration from Contract Award to the Contract Completion Date. Schedule updates will build upon each other and will include design and construction increments. Typical activities to be included in the schedule shall be Design, Procurement, Government activities, construction quality control (CQM) activities, and construction activities. Submission of progress and revision data will be used to measure work progress, aid in the evaluation for requests for time extensions, and to provide the basis of all progress payments. The Critical Path Method (CPM) of network calculation shall be used to generate the project schedule and will utilize the Precedence Diagram Method (PDM) to satisfy both time and cost applications. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities.

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Network Analysis Schedule (NAS) and Reports; G

SD-06 Test Reports

Time Impact Analysis; G

SD-07 Certificates

Monthly Network Analysis Updates; G

SD-11 Closeout Submittals

Final Schedule; G

1.3 SOFTWARE

The scheduling software to be used shall be Primavera Project Planner (P3)™ or Primavera SureTrak™ by Primavera Systems, Inc. Discuss autocost rules with Contracting Officer prior to schedule development.

1.4 NETWORK SYSTEM FORMAT

The system shall consist of time scaled logic diagrams and specified reports. Show the order and interdependence of activities and the sequence in which the work is planned to be accomplished.

CPM schedule activities shall be "task" type. Once an activity exists on the schedule, it may not be deleted or renamed, and must remain in the logic. Each activity shall have predecessor and successor ties. The diagram shall clearly show the activities of the critical path. No more than 20 percent of the activities may be critical or near critical. Each activity shall be cost-loaded for payment purposes; the total of all cost-loaded activities shall be equal to 100 percent of the value of the contract. Show the following information on the diagrams for each activity:

a. Activity ID

b. Activity Description

c. Original Duration in Work Days

d. Remaining Duration

e. Actual Duration in Work Days

f. Early Start Date

g. Early Finish Date

h. Total Float

Schedule activity duration(s) shall include normal anticipated adverse weather conditions from the National Oceanic and Atmospheric Association's (NOAA) historical monthly averages for the last five years for the NOAA location closest to the contract site.

1.4.1 Schedule Software Settings and Restrictions

Activity Constraints: Date/time constraint(s), other than those required by the contract, will not be allowed unless accepted by the Contracting Officer. Identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

1.4.2 Required Tabular Reports

The following reports shall be included with the schedule submittals and in each updated schedule submission provided on disk by the Contractor:

a. Earned Value Report: List all activities showing budget amount and cost.

b. Log Report: List all changes made between the previous schedule and current updated schedule.

c. Activity ID Report: Show the current status of all activities.

1.4.3 Correspondence

All correspondence (e.g. letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference the Schedule Activity Number(s) that are being addressed.

1.5 SUBMISSION AND ACCEPTANCE

The Contractor is responsible for scheduling, sequencing, and prosecuting the work to comply with the requirements of the contract documents. Prior to the preparation of the Network Analysis Schedule (NAS) for acceptance; the Contracting Officer and Contractor shall participate in a preliminary meeting to discuss the proposed schedule and requirements of this section prior to submission of the network. The schedule shall include an appropriate number of design, procurement, Government, CQM, and construction activities. Appropriate costs shall be apportioned to these activities.

Submit two copies of the Network Analysis Schedule (NAS) and Reports defining the planned operations during the contract.

Once review comments are resolved and the Contracting Officer has approved the Network Analysis Schedule, provide the following within 5 calendar days:

Two copies of the network diagrams.

Two copies of the reports listed in paragraph entitled "Required Tabular Reports."

Two sets of data disks containing the project schedule.

1.5.1 Monthly Network Analysis Updates

At monthly intervals the Contractor and Government representatives will meet to jointly update the project schedule and agree on percentage of payment for each activity progressed during the update period. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. The submission of an error free, acceptable updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request.

a. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates.

b. Reflect changes in the network diagram.

c. Submit two copies of a Narrative Report describing: 1) Progress; 2) Changes in the following: activities, original durations, logic interdependencies, milestones, critical path, and resource loading; 3) Pending items; 4) Status of Contract Completion Date and interim milestones; 5) Current and anticipated delays; and 6) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID.

d. Submit two copies of the reports listed in paragraph entitled "Required Tabular Reports," two hard copies of the network diagrams and two sets of data disks.

1.5.2 Final Schedule

As a condition precedent to the release of retention and making final payment, submit a "Final Schedule," which is the last schedule update showing all activities at 100 percent completion. This schedule shall reflect the exact manner in which the project was actually constructed.

1.6 CONTRACT MODIFICATION

When a contract modification to the work is required, submit proposed revisions to the network with a fragnet and a cost proposal for each proposed change. All modifications shall be incorporated into the schedule as separate identifiable activities broken down and inserted appropriately on the first update following issuance of a directive to proceed with the change.

1.7 FLOAT

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Government or the Contractor. Project Float will be a resource available to both the Government and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the Project's critical path. Use of float suppression techniques is prohibited.

1.7.1 Time Impact Analysis

The Time Impact Analysis method (for forward negotiating) or Windows Analysis (for after-the-fact negotiating) will be used by the Contracting Officer and Contractor in determining if a time extension or reduction to the contract milestone date(s) is justified. Provide a Time Impact Analysis or Windows Analysis to the Contracting Officer for any proposed contract change or as support for a Value Engineering Proposal, Variance Request, Claim, or Request for Equitable Adjustment by the Contractor. Submit three copies of the Time Impact Analysis schedule or Windows Analysis, reports, etc. on disk and as a printed/plotted hardcopy.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 01331N

DESIGN SUBMITTAL PROCEDURES
02/06

PART 1 GENERAL

1.1 SUMMARY

This section includes requirements for Contractor-originated design documents and design submittals.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The latest version of the publication at time of award shall be used.

U.S. GREEN BUILDING COUNCIL

USGBC LEED GBRS	LEED Green Building Rating System
USGBC LEED RG	LEED Reference Guide

U.S. DEPARTMENT OF DEFENSE (DoD)

UFC 1-200-01	General Building Requirements
UFC 1-300-08	Criteria for Transfer and Acceptance of Military Real Property Handbook
UFC 1-300-09N	Design Procedures
UFC 1-300-10N	Electronic Design Deliverables
UFC 3-100-10N	Unified Facilities Criteria - Design: General Architectural and Interiors Requirements (DGAIR)
UFC 3-200-10N	Unified Facilities Criteria - Design: General Civil, Geotechnical Landscape Requirements (DGCGLR)
UFC 3-300-10N	Unified Facilities Criteria - Design: General Structural Requirements (DGSR)
UFC 3-400-10N	Unified Facilities Criteria - Design: General Mechanical Requirements (DGMR)
UFC 3-500-10N	Unified Facilities Criteria - Design: General Electrical Requirements (DGER)
UFC 3-600-01	Unified Facilities Criteria - Design: Fire Protection Engineering for Facilities (DFPEF)

UFC 3-600-10N	Unified Facilities Criteria - Design: General Fire Protection Requirements (DGFPR)
UFC 3-800-10N	Unified Facilities Criteria - Design: General Environmental Requirements (DGEVR)

1.3 GENERAL DOCUMENTATION REQUIREMENTS

Contractor-originated design documents shall represent a project design that complies with the Request for Proposal (RFP), UFC 1-300-09N, UFC 1-300-10N, and the architectural and engineering discipline UFCs design guidance listed below. Provide design documentation in the English language and utilize English (foot-pound) measures and dimensions.

a. UFC 1-200-01 General Building Requirements

b. UFC 3-100-10N DGAIR

c. UFC 3-200-10N DGCGLR

d. UFC 3-300-10N DGSR

e. UFC 3-400-10N DGMR

f. UFC 3-500-10N DGER

g. UFC 3-600-01 DFPEF

h. UFC 3-600-10N DGFPR

i. UFC 3-800-10N DGEVR

1.4 SUBMITTALS

Submit design submittals, including shop drawings used as design drawings, to the Government for approval. The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Submittal Register; G

SD-05 Design Data

Design Drawings; G

Specifications; G

Design Analysis; G

Contractor Data Required for DD Form 1354; G

Design Submittals; G

Sustainable Design; G

SD-07 Certificates

LEED Green Building Rating System (GBRS); G

SD-11 Closeout Submittals

Record Documents; G

1.5 DESIGN QUALITY CONTROL

1.5.1 Contractor Reviewing and Certifying Authority

The QC organization is responsible for reviewing and certifying that design submittals are in compliance with the contract requirements.

1.5.2 Government Approving Authority

The Contracting Officer is the approving authority for design submittals.

1.5.3 Contractor Construction Actions

Upon approval of sealed and signed design documents certified by the Design Quality Control (DQC) and the Quality Control (QC) Managers, the Contractor may proceed with material and equipment purchases, fabrication and construction of any elements covered by that submittal, except as specified in the following paragraph.

1.5.4 Contractor's Responsibilities

a. Indicate on the transmittal form accompanying submittal which design submittals are being submitted as shop drawings.

b. Advise Contracting Officer of variations, as required by paragraph "Variations."

c. Provide an updated, cumulative submittal register with each design package that identifies the design and construction submittals required by that design package and previous submittals.

1.5.5 QC Organization Responsibilities

a. Both the DQC and the QC Manager must certify design submittals for compliance with the contract documents.

b. QC organization shall certify submittals forwarded by the Designer of Record (DOR) to the Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number (insert contract number here), is in compliance with the contract documents, and is submitted for Government approval.

Certified by Design Quality Control Manager _____,

Date _____

Certified by QC Manager_____,
Date _____"

c. Sign certifying statement. The persons signing certifying statements shall be the QC organization members designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

d. Update submittal register as submittal actions occur and maintain the submittal register at project site until final approval of all work by Contracting Officer.

e. Retain a copy of approved submittals at project site.

1.5.6 Government Responsibilities

The Government will:

a. Note date on which submittal was received from QC Manager, on each submittal.

b. Perform a quality assurance (QA) review of submittals. Upon completion, Government will sign and return electronic copy to the Contractor.

1.5.6.1 Actions Possible

Submittals will be returned with one of the following notations:

a. Submittals may be marked "approved."

b. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and certified by Contractor, or is not complete. Submittal will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

c. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. If work has been started on the unacceptable portion of the design submittal, the Contractor shall propose corrective action. No further work shall proceed until the issue is resolved in a manner satisfactory to the Government.

1.6 DESIGN DRAWINGS

1.6.1 Shop Drawings Used as Design Drawings

Design drawings may be prepared more like shop drawings to minimize construction submittals after final designs are approved. Therefore, the Contractor is encouraged to prepare and submit with the design drawings, appropriate connection, fabrication, layout, and product specific drawings.

1.6.2 Drawing Format for Shop Drawings Used as Design Drawings

The Contractor-originated drawings will be used as the basis for the record drawings. Shop drawings included as design documents shall comply with the same drawing requirements such as drawing form, sheet size, layering, lettering, and title block used in design drawings.

1.6.3 Identification of Shop Drawings Used as Design Drawings

The Contractor's transmittal letter shall indicate which shop drawings are being submitted as design drawings.

1.6.4 Drawing Standards

Prepare, organize, and present design drawings in accordance with the requirements of UFC 1-300-09N and UFC 1-300-10N.

Submit all CADD files for the final drawings on CD-ROM disks in AutoCAD 2006 format. Drawing files shall be full files, uncompressed and unzipped.

1.6.5 Naval Facilities (NAVFAC) Engineering Command Drawing Numbers

Number the final Contractor-originated design drawings consecutively with NAVFAC drawing numbers. Determine the total number of sheets required for the complete set of drawings before requesting the NAVFAC drawing numbers from the Contracting Officer.

1.6.6 Seal on Documents

All final Contractor-originated design drawings shall be signed, dated, and bear the seal of a registered architect or a registered engineer. This seal shall be the seal of the Designer of Record for that drawing. A principal or authorized licensed or certified employee shall electronically sign and date final drawings and cover sheet, in accordance with UFC 1-300-10N.

1.7 SPECIFICATIONS

Provide a Contractor-originated design specification that, in conjunction with the drawings, demonstrates compliance with materials, equipment, execution, and field quality control requirements of the RFP. The specified products, equipment, fixtures, devices, and systems submitted by the Contractor and approved by the Contracting Officer shall be used to construct the project. Prescriptive Technical Sections contained in Part 5 of this RFP shall become a part of the Contractor-originated specification without any changes and as provided in the RFP.

1.7.1 Specifications Format

Unless the use of a UFGS section is required, the Contractor may prepare design specifications that include manufacturer specific data and catalog cuts in lieu of prescriptive specifications. Organize the specifications using Construction Specification Institute (CSI) Masterformat™. A

prescriptive specification is required for all items for which the Contractor has not made final materials and equipment choices. Provide specifications to include the following:

a. Cover sheet and table of contents.

b. Specification sections.

c. Manufacturer's product data.

1.7.2 Fire Protection Specifications

Specifications pertaining to spray-applied fire proofing and fire stopping, exterior fire alarm reporting systems, interior fire alarm and detection systems, and fire suppression systems, including fire pumps and standpipe systems shall be either prepared by, or reviewed and approved by the Fire Protection Designer of Record.

1.7.3 Identification of Manufacturer's Product Data Used as Specifications

Provide complete and legible catalog cut sheets, product data, installation instructions, operation and maintenance instructions, warranty, and certifications for products and equipment for which final material and equipment choices have been made. Indicate, by prominent notation, each product that is being submitted including optional manufacturer's features, and indicate where the product data shows compliance with the RFP.

1.7.4 Submittal Register

Provide cumulative register in format prescribed by the Government and that identifies the design and construction submittals required by that design package and previous submittals. To obtain Government approval of the final design package, complete all fields in the submittal register.

1.7.5 Specification Software

Submit the final specification source files in either MS Word or SpecsIntact.

1.8 DESIGN ANALYSIS

Prepare, organize, and present design analysis in accordance with the requirements of UFC 1-300-09N. The design analysis shall be a presentation of facts to demonstrate the concept of the project is fully understood and the design is based on sound engineering principles. Provide design analyses for each discipline and include the following:

a. Basis of design that includes:

(1) An introductory description of the project concepts that addresses the salient points of the design;

(2) An orderly and comprehensive documentation of criteria and rationale for system selection; and

(3) The identification of any necessary licenses and permits that are anticipated to be required as a part of the design

and/or construction process. The "Permits Record of Decision" (PROD) form shall be used for recording permits.

b. Code and criteria search shall identify all applicable codes and criteria and highlight specific requirements within these codes and criteria for critical issues in the facility design.

c. Calculations as specified and as needed to support this design.

d. Section titled "Sustainable Design" that addresses sustainable concepts and LEED Rating Analysis Report prepared by a LEED Accredited Professional recognized by the U.S. Green Building Council.

e. Section titled "Antiterrorism" that documents the antiterrorism features.

1.8.1 Basis of Design Format

The basis of design for each design discipline shall include a cover page indicating the project title and locations, contract number, table of contents, tabbed separations for quick reference, and bound in separate volumes for each design discipline.

1.8.2 Design Calculations

Place the signature and seal of the designer responsible for the work on the cover page of the calculations for the respective design discipline.

1.8.3 Sustainable Design

Provide integrated sustainable design strategies and features to minimize the energy consumption of the facilities; conserve resources; minimize adverse effects to the environment; and improve occupant productivity, health, and comfort. In accordance with NAVFAC Instruction 9830.1, the facility and all site features shall be designed and constructed to meet a minimum of "Certified" in the U.S. Green Building Council USGBC LEED GBRS. The constructed facility shall be Self Certified by NAVFAC as having met all prerequisites and at least 26 additional credits in the LEED-NC (New Construction) rating system.

The minimum sustainable design requirement for the project is to meet LEED certified level (26 credits). The design effort shall seek out integrated design solutions that provide the best value for the facility, and do not increase the overall cost of the project beyond the available budget. Provide documentation as required and coordinate the sustainable features of the design to assure they are properly installed during construction.

Information and resources on sustainable design principles and guidelines are explained in the "Whole Building Design Guide" that can be found at www.wbdg.org.

1.8.3.1 LEED Green Building Rating System (GBRS) Submittals – Self-Certification

Provide an analysis of the U.S. Green Building Council’s LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) criteria as it applies to the design

of this project and include updated information with each design submittal. The Navy endorses the principles of sustainable design contained in the USGBC LEED GBRS (and USGBC LEED RG) and will utilize this system as a means of measuring the degree of implementation of sustainable principles. Include the following in the analysis report:

a. A completed LEED Project Checklist indicating all LEED USGBC Prerequisites and Credits to be implemented into the facility design and the total anticipated LEED GBRS score for the project.

b. Description of how each anticipated LEED Prerequisite and Credit point will be achieved.

Sustainable Verification Documentation signed by the LEED Accredited Professional stating that the analysis report items provide an accurate estimate of the LEED GBRS rating that the U.S. Green Building Council would assign to the project design.

Submit the following:

(1) For the Basis of Design submittal, provide a Preliminary Statement.

(2) For each design submittal, provide Progress Statement. Deviations from previously reported LEED rating score shall be documented, highlighted, and submitted with the design submittal for Government approval.

(3) For 100% design submittal, provide preliminary LEED documentation, in the form of a three-ring binder, of all LEED Prerequisites and Credits to be obtained as required by the USGBC LEED-NC Rating System.

(4) For final design submittal, update the LEED documentation binder with any changes.

1.8.3.2 Sustainable Designer

The design team shall include at least one LEED Accredited Professional as recognized by the U.S. Green Building Council. The LEED Accredited Professional shall have an active role in the design of the facility and be responsible for implementation and documentation of sustainable strategies and materials in the project.

1.8.3.3 EPA Designated Products

Use products that meet or exceed the minimum requirements of this RFP and the EPA guideline standards for recovered content to the maximum practicable extent in the performance of the contract. See www.epa.gov/cpg/products.htm for a list of EPA designated products and a list of manufacturers and suppliers of EPA designated products.

1.9 RECORD DOCUMENTS

1.9.1 Record Drawings

The as-built modifications shall be accomplished by electronic drafting methods on the Contractor-originated .DWG design drawings to create a complete set of record drawings.

a. For each record drawing, provide CADD drawing identical to signed Contractor-originated .PDF drawings, that incorporates modifications to the as-built conditions. In addition, copy initials and dates from the Contracting Officer approved .PDF documents to the title block of the record CADD .DWG drawings. The RFP reference or definitive drawings are not required for inclusion in the record set of drawings.

b. After all as-built conditions are recorded on the CADD .DWG files, produce a .PDF and .TIF file of each individual record drawing in conformance with UFC 1-300-09N and UFC 1-300-10N. Electronic signatures are not required on record drawings.

1.9.2 Source Documents

Provide the specifications, design analysis, reports, surveys, calculations, and any other contracted documents on the CD-ROM disk with the record drawings.

1.9.3 DD Form 1354

Complete and submit the form CONTRACTOR DATA REQUIRED FOR DD FORM 1354 that is included as an attachment in Part 6. An electronic version of this form is available upon request.

PART 2 PRODUCTS

2.1 CONFORMED CONTRACT DOCUMENTS

Within two weeks after contract award provide 4 electronic copies on CD-Rom and 10 hard copies of a conformed RFP document reflecting all amendments. Identify the changes with the "Red-Lining" or "Change Tracking" feature of SpecsIntact or MS Word to highlight the modifications to the contract.

2.2 DESIGN SUBMITTALS

Complete the Contractor-originated design submittals as defined by this contract, and coordinate with the approved design network analysis schedule.

2.2.1 Design Submittal Packages

The Government prefers to review for Quality Assurance (QA) as few submittal packages as possible. Site and Building Design Submittal Packages are required.

2.2.1.1 Site Design

The Site Design typically includes the following components:

a. Master Site Plan

b. Demolition

c. Site work, Environmental, and Civil

d. Utilities Plan

e. Geotechnical

2.2.1.2 Building Design

The Building Design typically includes the following components:

a. Foundation

b. Structural

c. Building Enclosures

d. Remaining Work

e. Furniture/Equipment

2.2.2 Required Design Submittals

The following Design Submittals are required, comprehensive, multi-discipline design packages and shall include all design documentation for all project elements fully developed to the design stage indicated.

a. Concept Design presented at PAK Meeting – 14 calendar day Government review.

b. Design Development, 50-60 percent - 21 calendar day Government review.

c. 100 percent (Prefinal) Design - 28 calendar day Government review.

d. Final Design - 14 calendar day Government review.

2.2.3 Review Copies of Design Submittal Packages

Provide copies of each design submittal package for review to the following reviewers. Addresses for mailing will be furnished at the PAK meeting. Send all submittals via overnight mail.

a. 4 copies to NAVFAC Southeast.

b. 2 copies to ROICC Gulfport, Stennis Satellite Office (Paul Mullins).

c. 5 copies to Public Works Gulfport.

d. 1 copy to CIH

e. 3 copies to LY Croke, NSW Group 3, Little Creek NAB, VA.

f. 1 copy to Sam Martindale, Code N4412, Naval Special Warfare Command, 2000 Trident Way, Bldg. 624, San Diego, CA 92155.

g. 4 copies to URS.

Quantities of copies for resubmittals shall be the same as specified for each design submittal.

2.3 IDENTIFICATION OF DESIGN SUBMITTALS

Provide a title sheet to clearly identify each submittal, the completion status, and the date. The title sheet shall use the standard format indicated in the UFC 1-300-09N/UFC 1-300-10N for title sheets. The title sheet shall be unique to a particular design submittal. Submit the project title sheet with design status and date for the design submittals.

PART 3 EXECUTION

3.1 CONTRACTOR'S RESOLUTION OF COMMENTS

Provide written responses to all written comments by the Government. Resubmittal of an unacceptable design submittal shall be a complete package that includes all the required, specified components of that design submittal. Government required resubmittal for conformance to the contract is not a delay in the contract.

3.2 VARIATIONS

Variations from contract requirements require Government approval and will be considered where advantageous to the Government. The Designer of Record must approve any proposed variation prior to submittal to the Government.

3.3 THE CONTRACT AND ORDER OF PRECEDENCE

3.3.1 Contract Components

The contract consists of the solicitation, the approved proposal, and the final design.

3.3.2 Order of Precedence

In the event of a conflict or inconsistency between any of the requirements of the various portions of the contract, precedence shall be given in the following order:

a. Any portions of the approved proposal or approved final design that exceed the requirements of the solicitation.

b. As between the approved final design and the approved proposal:

(1) Any portion of the approved proposal that exceeds the approved final design.

(2) Any portion of the approved final design that exceeds the approved proposal.

c. The requirements of the solicitation.

d. Those portions of the approved proposal or approved final design that meet but do not exceed the solicitation requirement.

3.3.3 Government Approval

Government review or approval of any portion of the proposal or final design shall not relieve the Contractor from responsibility for any errors or omissions with respect thereto.

-- End of Section --

SECTION 01332N

CONSTRUCTION SUBMITTAL PROCEDURES
02/06

PART 1 GENERAL

1.1 SUMMARY

This section covers construction submittals that are not included in the design submittals. Submit design submittals in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES.

1.2 SUBMITTAL DESCRIPTIONS (SD)

Government approval is required for submittals with a "G" designation.

Submittal requirements are specified within technical sections. Submittals are identified by SD numbers and titles as follows:

SD-01 Preconstruction Submittals

Certificates of insurance; G
Surety bonds; G
List of proposed subcontractors; G
List of proposed products; G
Construction Progress Schedule; G
Submittal register; G
Schedule of values; G
Health and safety plan; G
Work plan; G
Quality control plan; G
Environmental protection plan; G

SD-02 Shop Drawings

Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures illustrating size, physical appearance, and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses, or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system, or material attesting that product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer, or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards, and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer or the system provider to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

OMSI manuals submitted at various stages and progression of construction.

1.3 SUBMITTALS

The use of a "G" following a submittal indicates that an approval action is required, either by the Government or by the Contractor's Designer of Record (DOR) or QC Specialist.

Submit the following in accordance with the requirements of this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 CONSTRUCTION QUALITY CONTROL

1.4.1 Contractor Reviewing, Certifying, Approving Authority

The QC organization is responsible for reviewing and certifying that submittals are in compliance with the contract requirements. The Contractor's DOR or QC Specialist is the approving authority for submittals with a "G" designation in Part 4 PERFORMANCE TECHNICAL SPECIFICATIONS and in Part 5 PRESCRIPTIVE SPECIFICATIONS, unless indicated otherwise. Submittals not having a “G” designation are for Contractor Quality Control approval.

1.4.2 Government Approving and Reviewing Authority

1.4.2.1 Submittals Reserved for Government Approval

Government approval is required for submittals with a "G" designation in RFP Part 2 GENERAL REQUIREMENTS, Division 01 Specification Sections.

In addition to the RFP Part 2 Division 01 Government approvals, the following submittals shall be certified by the QC Manager and the DOR and approved by the Contracting Officer:

a. Boiler(s)

b. Chiller(s)

c. DDC System(s)

d. Fire Suppression Systems

e. Fire Alarm Systems

f. Pad-Mounted Service Transformer(s)

g. Generator(s)

1.4.2.2 Submittals Reserved for Government Surveillance

Only send submittals stamped "APPROVED" by the DOR or QC Specialist. Submittals shall be stamped "FOR SURVEILLANCE ONLY." Submit 2 copies of Surveillance submittals to the Government prior to starting work for that item.

a. Submit fire protection related submittals pertaining to spray-applied fire proofing and fire stopping, exterior fire alarm reporting systems, interior fire alarm & detection systems, and fire suppression systems including fire pumps and standpipe systems.

1.4.3 Constraints

a. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.

b. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.4.4 Scheduling

Except as specified otherwise, allow review period, beginning when Government receives submittal from the QC organization, of 20 working days for return of submittal to the Contractor. Period of review for submittals with contracting officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.

1.4.5 Variations

Variations from contract requirements require Government approval and will be considered where advantageous to the Government.

1.4.5.1 Considering Variations

Variations from contract requirements including the solicitation, the accepted proposal, and the final design, require Government approval and will be considered where advantageous to the Government. Variations to the contract requirements must be approved by the Designer of Record prior to submittal to the Government for approval of the Variation.

1.4.6 Contractor's Responsibilities

Ensure no work has begun until submittals for that work have been "approved" or "approved as noted."

1.4.7 QC Organization Responsibilities

a. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is Contracting Officer, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number (insert contract number here), is in compliance with the contract documents, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by DQC Manager _____, Date _____

Certified by QC Manager _____, Date __ ____"

b. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

c. Update submittal register database as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by contracting officer.

d. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.4.8 Government's Responsibilities

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC Manager, on each submittal for which the Contracting Officer is approving authority.

b. Review submittals for compliance with contract documents.

1.4.8.1 Government Actions

Submittals will be returned with one of the following notations:

a. Submittals marked "approved" or "approved as submitted" authorize Contractor to proceed with work covered.

b. A submittal marked "not reviewed" will be returned with an explanation of the reason it was not reviewed.

c. Submittals marked "approved as noted" or "approval except as noted; resubmission not required" authorize Contractor to proceed with work as noted provided Contractor takes no exception to the notations.

d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

e. Submittals required for surveillance will be returned only if corrective actions are required.

1.5 FORMAT OF SUBMITTALS

1.5.1 Transmittal Form

Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project.

1.6 QUANTITY OF SUBMITTALS

Submit four (4) copies of submittals of shop drawings requiring review and approval by Contracting Officer if not electronically submitted in WebCM.

1.6.1 Submittals Reserved for Government Surveillance

Submit two (2) copies of submittals specified for surveillance to the Contracting Officer if not electronically submitted in WebCM.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01451N

DESIGN AND CONSTRUCTION QUALITY CONTROL
02/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 329	(2002) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Design Quality Control (DQC) Plan; G

Submit a DQC Plan prior to the Post Award Kickoff Meeting.

Construction Quality Control (CQC) Plan; G

Submit a Construction QC Plan prior to start of construction.

SD-07 Certificates

Preliminary Inspections and Final Acceptance Testing; G

Final Life Safety/Fire Protection Certification; G

SD-11 Closeout Submittals

Training Course Outline; G

Training Video Recording; G

1.3 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program that is administered by a Design and Construction Quality Control organization, using Quality Control (Design and Construction) Plans, meetings, a Coordination and Mutual Understanding

Meeting, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications and documentation necessary to provide design, materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this contract. The QC program shall cover on-site and off-site work. No construction work or testing may be performed unless the QC Manager is on the work site.

1.3.1 Design and Construction Quality Control Plans

The Contractor shall provide a project specific Design Quality Control (DQC) Plan and Construction Quality Control (CQC) Plan, for review and acceptance by the Government. The Contractor shall perform no construction under this contract until the Contracting Officer accepts the DQC Plan and the CQC Plan. The Contractor's plan shall include the following:

a. The QC organization for this contract, including member resumes.

b. A letter from an officer of the company designating the QC Manager, Alternate QC Manager, and DQC Manager, and their authority.

c. QC Manager qualifications.

d. DQC Manager qualifications.

e. List of Definable Features of Work (DFOW) including list of design submittal packaging. DFOW is a task that is separate and distinct from other tasks and has control requirements and work crews unique to the task.

f. Plan to implement the "Three Phases of Control" for each DFOW.

g. Testing Plan, log and list of personnel and accredited laboratories that will perform tests. Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation with the testing plan.

h. Submittal Log including design submittals, listing personnel who will review submittals and noting submittals for Government review.

i. Procedures for submitting and reviewing variations prior to submission to the Government.

j. A plan for implementing the applicable requirements of the International Building Code (IBC), Chapter 17 "Structural Tests and Special Inspections." As a part of the plan, a statement of Special Inspections shall be prepared by the Designer of Record (DOR) describing a complete list of materials and work requiring special inspections, the inspections to be performed and any applicable quality assurance plans and structural observations. The plan will include a listing of the individuals, approved agencies or firms that will be retained for conducting the required special inspections accompanied by a description of individual inspector's experience and a copy of all required certifications. Structural tests and special inspections, as outlined in Chapter 17 of the IBC shall be conducted by individuals and agents that are under the direct supervision of a Registered Design Professional (RDP) and meet the requirements of ASTM E 329.

1.3.2 Quality Control Spreadsheets

The Quality Control Manager (QCM) shall create and maintain two quality control spreadsheets or databases, and use them together to manage the quality control inspection and rework processes. The Government Quality Assurance Manager (QAM) will use the same information to manage the quality assurance processes.

After approval of the definable features of work list, the inspection spreadsheet will be formatted with definable features of work as column headings and every interior and exterior space as row titles. To facilitate data manipulation and reporting, each definable feature of work column shall be further subdivided into six (6) sub-columns, as follows: foreman's initials, foreman's certification date, QCM's initials, QCM certification date, QAM initials, and QAM certification date. The spreadsheet shall be updated daily by the project foreman and the QCM, and will be updated at least weekly by the Government QAM.

The rework spreadsheet shall be used in conjunction with the inspection spreadsheet. The spreadsheet shall be formatted with each row from the inspection spreadsheet as a separate tab. Each tab shall have the following columns: work item, foreman's initials, foreman's certification date, QCM initials, QCM certification date, QAM initials, and QAM certification date. When a foreman certifies on the inspection spreadsheet that a definable feature of work is complete in an area, the QCM shall inspect that work on the next business day and develop a rework list. The field list shall be transferred to the rework spreadsheet and managed to completion and certification by all parties listed above. When the rework items are complete, the QCM may certify on the inspection spreadsheet that the work is complete and ready for QAM inspection. If additional rework is identified in the QAM inspection, this process shall be repeated as described above.

1.4 QC ORGANIZATION

The QC organization and supporting staff shall meet all of the following performance requirements.

Provide a QC Manager at the work site to implement and manage the QC Program. The QC Manager shall report to an officer of the firm and shall not be subordinate to the Project Superintendent or the Project Manager. The full time and only duties and responsibilities of the QC Manager are to manage and implement the QC Program on this Contract.

The Contracting Officer may require the QC Manager, or the DQC Manager, be removed and replaced, if the Contracting Officer determines that either is not performing satisfactorily.

1.4.1 QC Manager

QC Manager qualifications:

a. Complete the course entitled "Construction Quality Management (CQM) for Contractors."

b. Ten (10) years of combined experience as a Superintendent, QC Manager, Project Manager, or Project Engineer on similar size and

type construction contracts, and at least two (2) years experience as a QC Manager.

c. Familiar with requirements of USACE EM 385-1-1, and experience in the areas of hazard identification and safety compliance.

QC Manager responsibilities:

a. Participate in the Post Award Kickoff, Partnering, Design Development, and Coordination and Mutual Understanding Meetings.

b. Implement the "Three Phase of Control" plan for each DFOW and notify the Contracting Officer at least 3 business days in advance of each Preparatory and Initial Phase meeting. Submit respective checklists to the Contracting Officer the next business day.

c. Ensure that no construction begins before the DOR has finalized the design for that segment of work, and construction submittals are approved as required.

d. Inspect all work and rework, using International Conference of Building Officials certified QC specialists as applicable, to ensure its compliance with contract requirements. Maintain a rework log.

e. Immediately stop any segment of work, which does not comply with the contract plans and specifications, and direct the removal and replacement of any defective work.

f. Remove any individual from the site who fails to perform their work in a skillful, safe and workmanlike manner or whose work does not comply with the contract plans and specifications.

g. Prepare daily QC Reports.

h. Ensure that Contractor Production Reports are prepared daily.

i. Hold weekly QC meetings with the DQC, DOR (or representative), Superintendent and the Contracting Officer; participation shall be suitable for the phase of work. Post minutes of these meetings.

j. Ensure that Safety Officer inspections are performed. Attend weekly Toolbox meetings.

k. Ensure that design and construction submittals are reviewed and approved, as required by the contract, prior to allowing material on site and work to proceed with these items. Maintain a submittal log.

l. Update As-built drawings daily, maintaining up-to-date set on site.

m. Maintain a testing plan and log. Ensure that all testing is performed per the contract. Review all test reports and notify the Contracting Officer of all deficiencies, along with a proposal for corrective action.

n. Maintain deficiency log on site, noting dates deficiency identified, and date corrected.

o. Certify and sign statement on each invoice that all work to be paid under the invoice has been completed in accordance with contract requirements.

p. Perform Punch-out and Pre-final inspections, and participate in Final Inspections. Submit list of deficiencies to the Contracting Officer for each inspection. Correct all deficiencies prior to the Final inspection. Notify Contracting Officer prior to Final Inspection to establish a schedule date acceptable by the Contracting Officer.

q. Ensure that all required keys, operation and maintenance manuals, warranty certificates, and the As-built drawings are correct and complete, per the contract, and submitted to the Contracting Officer.

r. Assure that all applicable tests, special inspections, and observations required by the contract are performed.

s. Coordinate all factory and on-site testing, Testing Laboratory personnel, QC Specialists, and any other inspection and testing personnel required by this contract.

t. Notify the Contracting Officer of any proposed changes to the QC plan.

1.4.2 DQC Manager

DQC Manager qualifications:

a. A minimum of five (5) years experience as a design Architect or Engineer on similar size and type designs or design-build contracts. Provide education, experience, and management capabilities on similar size and type contracts.

b. Be a registered professional engineer or architect with active registration in the State in which the project will be constructed. Provide proof of registration as part of the resume submittal package.

DQC Manager responsibilities:

a. Be responsible for the design integrity, professional design standards, and all design services required.

b. Be a member of the Designer of Record's (DOR) firm.

c. Be responsible for development of the design portion of the QC Plan, incorporation and maintenance of the approved Design Schedule, and the preparation of DQC Reports and minutes of all design meetings.

d. Participate in the Post Award Kick-Off meeting, all design planning meetings, design presentations, and partnering.

e. Implement the DQC plan and shall remain on staff and involved with the project until completion of the project.

f. Be cognizant of and assure that all design documents on the project have been developed in accordance with the Contract, and have been properly coordinated.

g. Perform submittal review and approval functions for the QC Manager.

h. Coordinate all training issues and shall validate that the testing and training requirements of this contract are accomplished.

i. Provide QC certification for design compliance.

1.4.3 QC Specialists

QC Specialists shall assist and report to the QC Manager and may perform production related duties but must be allowed sufficient time to perform their assigned quality control duties. QC Specialists are required to attend the Coordination and Mutual Understanding Meeting, QC meetings and be physically present at the construction site to perform the three phases of control and prepare documentation for each definable feature of work in their area of responsibility at the frequency specified below.

1.4.3.1 Fire Protection QC Specialist

The Fire Protection QC Specialist shall be a U.S. Registered Fire Protection Engineer (FPE) and shall be an integral part of the Prime Contractor's Quality Control Organization. This FPE shall have no business relationships (owner, partner, operating officer, distributor, salesman, or technical representative) with any fire protection equipment device manufacturers, suppliers or installers for any such equipment provided as part of this project. The Fire Protection Designer of Record may serve as the lead Fire Protection QC Specialist.

a. Qualifications/Experience: The FPE shall have obtained their professional registration by successfully completing the Fire Protection Engineering discipline examination. This FPE shall have a minimum of 5 years full time and exclusive experience in every aspect of facility design and construction as it relates to fire protection, which includes, but is not limited to, building code analysis, life safety code analysis, design of automatic detection and suppression systems, passive fire protection design, water supply analysis, and a multi-discipline coordination reviews, and construction surveillance.

b. Area of Responsibility: The FPE is responsible for assuring the proper construction and installation of life safety and fire protection features across all disciplines and trades. The FPE shall be responsible for assuring that life safety and fire protection features are provided in accordance with the design documents, approved construction submittals, and manufacturer's requirements. Examples include, but are not limited to, water distribution systems including fire pumps and fire hydrants, fire resistive assemblies such as spray-applied fire proofing of structural components and fire rated walls/ partitions, fire alarm

and detection systems, fire suppression and standpipe systems, emergency and exit lighting fixtures, etc.

c. Construction Surveillance: The FPE shall visit the construction site as necessary to ensure life safety and fire protection systems are being constructed, applied, and installed in accordance with the approved design documents, approved construction submittals, and manufacturer's requirements. Frequency and duration of the field visits are dependent upon particular system components, system complexity, and phase of construction. At a minimum, field visits shall occur just prior to installation of suspended ceiling system to inspect the integrity of passive fire protection features and fire suppression system piping, preliminary inspections of fire alarm/ detection and suppression systems, and final acceptance testing of fire alarm/detection and suppression systems.

(1) Preliminary Inspections and Final Acceptance Testing: FPE shall personally witness all preliminary inspections of fire alarm/ detection and suppression systems. Once preliminary inspections have been successfully completed, the FPE shall submit a signed certificate to the QC Manager that systems are ready for final inspection and testing. The NAVFAC Southeast FPE will witness formal tests and approve all systems before they are accepted. The QC Manager shall submit the request for formal inspection at least 15 work days prior to the date the inspection is to take place. The QC Manager shall provide 10 work days advance notice to the Contracting Officer and the activity Fire Inspection Office of scheduled final inspections.

(2) Final Life Safety/Fire Protection Certification Documentation: The FPE shall provide certification that all life safety and fire protection systems have been installed in accordance with the contract documents, approved submittals, and manufacturer's requirements. This certification shall summarize all life safety and fire protection features, and shall bear the professional seal of the fire protection engineer.

1.5 THREE PHASES OF CONTROL

The Three Phases of Control shall adequately cover both on-site and off-site work and shall include the following for each DFOW.

1.5.1 Preparatory Phase

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting shall be conducted by the QC Manager and attended by the QC Specialists, the Project Superintendent, and the foreman responsible for the DFOW. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman shall attend the preparatory phase meeting. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

e. Examine the work area to ensure that the required preliminary work has been completed;

f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

g. Discuss construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW; and

h. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

1.5.2 Initial Phase

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the QC Specialists, the Project Superintendent, and the foreman responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily CQC Report and in Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed by the approved laboratory, and

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

1.5.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed by the approved laboratory; and

d. Ensure that rework items are being corrected.

1.5.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same DFOW if the quality of ongoing work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.5.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.6 COMPLETION INSPECTIONS

The Contractor shall perform the necessary prefinal inspections, compile punchlists, and correct deficiencies. Notify the Contracting Officer 5 calendar days prior to the prefinal inspection to provide Contracting Officer option to attend. Notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. The Government will perform final inspection to verify that the facility is complete and ready to be occupied. All items previously identified on the prefinal punchlist will have been corrected and acceptable.

1.7 TRAINING

The DQC Manager shall provide a comprehensive project-specific Government personnel training program for the systems of the facility specified in the technical specifications of this Contract. The core of this training will be based on manufacturer's recommendations and the operation and maintenance support information (OMSI) provided as a part of this Contract. Training shall include classroom discussion as well as hands on maintenance, replacement of typical components and repair type maintenance training for parts typically replaced or repaired in the field, such as:

1. Plumbing systems, including temperature actuated thermostatic water mixing valve
2. HVAC Systems, including chillers, boilers, heat pumps, air handling equipment, hot and chilled water pumping system
3. Direct Digital Controls/Space Temperature Controls
4. Fire protection systems, including fire alarm systems and sprinkler systems
5. Site electrical utilities, including transformers.
6. Sanitary lift stations, including pumps, valves, controls, and monitoring systems

Provide each trainee in the course a written training course outline. Submit outline for approval at least 90 calendar days prior to training session. Provide to the Contracting Officer two copies of the training video recording in DVD format. Confirm media format required with the using activity. The recording shall capture, in video and audio, all instructors training presentations including question and answer periods with the trainees.

1.8 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01501N

TEMPORARY FACILITIES AND CONTROLS FOR DESIGN-BUILD
10/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(1997) Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(Continuously Updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(9th Edition) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2000) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 70	(2005) National Electrical Code

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SA-89-006	(1988) Manual on Uniform Traffic Control Devices for Streets and Highways

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Traffic control plan; G

Construction site plan; G

SD-03 Product Data

Backflow Preventers

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates

Backflow Tester Certification; G

Backflow Preventers Certificate of Full Approval

1.3 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. These non-construction products contain the highest practicable percentage of recycled or recovered materials and can be recycled when no longer needed.

1.4 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations of temporary facilities (including layouts and details, equipment and material storage area (on-site and off-site)), and access and haul routes used for this contract. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.5 BACKFLOW PREVENTERS CERTIFICATE

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval will not be acceptable.

1.5.1 Backflow Prevention Training Certificate

The Contractor shall submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.6 TEMPORARY UTILITIES

Reasonable amounts of the following utilities will be made available to the Contractor at prevailing rates:

Electricity
Potable Water

The point at which the Government will deliver such utilities or services and the quantity available shall be coordinated with the Contracting Officer. The Contractor shall pay all costs incurred in connecting, converting, and transferring the utilities to the work. The Contractor shall make connections, including providing backflow-preventing devices on connections to domestic water lines; and providing transformers; and make disconnections. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

1.7 BACKFLOW TESTER CERTIFICATION

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester shall not be affiliated with any company participating in any other phase of this contract.

1.8 WEATHER PROTECTION

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday.

1.8.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions shall include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

1.8.1.1 Hurricane Condition of Readiness

a. Destructive winds may occur at any time of year, but most frequently prevail during the period 01 June - 30 November, which is designated as “Hurricane Season.” Throughout this season the Contractor must maintain a state of readiness consistent with sound precautionary judgment; good housekeeping is essential. Near the beginning of Hurricane Season all Contractors shall attend an hour long All Contractors Meeting to review Contractor requirements during Hurricane Season. All Project Managers, Superintendents, and Quality Control Managers shall be in attendance. Time and date of the meeting shall be determined by the Contracting Officer.

b. The TROPCON requirements set forth below are a minimum. The intent of the requirement is to mitigate, to the extent practicable, storm damage potential to the job site and surrounding Government Property. In the event of storm damage, the prime Contractor’s responsibility will include any damage to materials and work performed (including Government furnished items).

c. Prime Contractors shall identify two key persons, in writing; a primary and an alternate, to serve as the government's point of contact should a hurricane threat arise. Home, office, and cell phone numbers for 24-hour contact shall be provided.

d. A storm protection plan shall be addressed, as an appendix, in the Contractor's Accident Prevention (Safety) Plan required by this contract. This storm plan shall address the specifics of how the Contractor will comply with each of the TROPCONs listed below and shall also include a contingency plan in the event that subcontractors fail to secure their materials and equipment. The Prime Contractor is ultimately responsible to the government for the condition of their jobsite.

e. Unless directed otherwise, comply with:

1. TROPCON FIVE (Normal Condition 01 June - 30 November): Dumpsters will remain relatively empty at all times and debris cleaned up and removed from the site daily (as required) during the entire hurricane season. Maintain good housekeeping practices. The Contractor shall provide, on the jobsite, hurricane gear such as ropes, stakes, and tarpaulins, to securely fasten all unfinished construction, stockpiles, tools, and equipment in the event of destructive weather.

2. TROPCON FOUR (Hurricane force winds possible within 72 hours): When TROPCON FOUR is set an All Contractors Meeting will be held at the ROICC Office. It will normally held be within 4 work-hours of notification. Each Contractor Superintendent and QC Manager (if applicable) shall attend. Exact time and date of the meeting to be determined by the Contracting Officer. Commence securing operations and stow all gear and portable equipment. Cease all routine activities, until the requirements of this TROPCON are fulfilled. Normal operations may resume and continue contingent on maintaining TROPCON FOUR readiness. If the Contractor fails to maintain readiness levels, normal work will be halted. All loose material and equipment must be compactly piled in stacks less than 4 feet high, and securely tied down to a piece of construction equipment, secured inside a structure, or to a large unmovable object at the jobsite to prevent missile hazards. Reinforce or remove formwork and scaffolding.

3. TROPCON THREE (Hurricane force winds possible within 48 hours): Complete all securing operations. All permitted Hot Work shall cease. Cease routine activities until securing operation is complete. Notify the ROICC for inspection when jobsite is secure and ready for evacuation. A work crew shall be maintained until released by the ROICC.

4. TROPCON TWO (Hurricane force winds possible within 24 hours): Leave Government premises.

5. TROPCON ONE (Hurricane force winds possible within 12 hours): All jobsites secure.

1.9 STATION OPERATION EFFECT ON CONTRACTOR OPERATIONS

1.9.1 Special Restrictions Regarding Access of Vehicles and Parking

1.9.1.1 Interruption of Vehicular Traffic

If during the performance of work, it becomes necessary to modify vehicular traffic patterns at any locations, notify the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan shall be in accordance with State and local regulations and the FHWA SA-89-006, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

1.10 STORAGE AREAS

Contractor shall be responsible for security of his property. The Contract Clause entitled FAR 52.236-10, Operations and Storage Areas and the following apply:

1.10.1 Storage in Existing Buildings

The Contractor shall be working around existing buildings; the storage of material will not be allowed in the buildings. Provide 8 foot high security fence with a lockable gate around the storage area. Remove at the completion of work.

1.11 TEMPORARY SANITARY FACILITIES

Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the Contracting Officer. The doors shall be self-closing. The exterior of the unit shall match the base standard color. Locate the facility behind the construction fence or out of the public view.

1.12 TEMPORARY BUILDINGS

Temporary facilities (including trailers) shall be in like new condition and shall be maintained throughout the project. Locate these facilities where directed and within the indicated operations area. Failure to maintain storage trailers or buildings to these standards shall result in the removal of non-complying units at the Contractor's expense. A sign not smaller than 24 by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailers shall be anchored to resist high winds and must meet applicable state of local standards for anchoring mobile trailers. Storage of material/debris under such facilities is prohibited. Contractor shall be responsible for the security of the stored property.

1.12.1 Quality Control Manager Records and Field Office

Provide on the jobsite an office with minimum 200 square feet of useful floor area for the exclusive use of the QC Manager. Provide a weathertight structure with adequate heating and cooling, toilet facilities, lighting, ventilation, a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications facilities. Provide a window-mounted heat pump rated at 9,000 Btus minimum for cooling/heating. Provide a door with a cylinder lock and windows with locking hardware. Make utility connections. Locate as directed. File quality control records in the office and make available at all times to the Government. After completion of the work, remove the entire structure from the site.

PART 2 PRODUCTS

2.1 BACKFLOW PREVENTERS

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged bronze mounted gate valve and strainer, 304 stainless steel, internal parts. The particular make, model/design, and size of backflow preventers to be installed shall be included in the latest edition of the List of Approved Backflow prevention assemblies issued by the FCCCHR List and shall be accompanied by a Certificate of Full Approval from the FCCCHR List.

2.2 PROJECT SIGN

Prior to initiating any work on site, provide one project identification sign at the location coordinated with the Contracting Officer. Construct the sign in accordance with project sign detail attached at the end of this section. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site.

2.2.1 Project Identification Signboard (Navy)

A project identification signboard shall be provided in accordance with attached Plates 1, 3, and 4. The signboard shall be provided at a conspicuous location on the job site where directed by the Contracting Officer.

a. The field of the sign shall consist of a 4 by 8 foot sheet of exterior plywood.

b. The entire signboard and supports shall be painted. The lettering and sign work shall be performed by a skilled sign painter using paint known in the trade as bulletin colors. The colors, lettering sizes, and lettering styles shall be as indicated.

c. NAVFAC logo shall be a sticker/decal with either transparent or white background or paint the logo by stencil onto the sign. The weather resistant sticker/decal film shall be rated for a minimum of 2-year exterior vertical exposure. NAVFAC logo colors and dimensional proportions must be chosen in accordance with the NAVFAC Brand and Style Guide. Brand and Style Guide is available at:

https://portal.navfac.navy.mil/portal/page?_pageid=34,35749,34_35755&_dad=ptl&_schema=PTLP.

d. Sign paint colors:

(1) Blue = To match dark blue color in the NAVFAC logo.

(2) White = To match Brilliant White color in the NAVFAC logo.

PART 3 EXECUTION

3.1 TEMPORARY PHYSICAL CONTROLS

3.1.1 Access Controls

3.1.1.1 Temporary Barricades

Contractor shall provide for barricading around all work areas to prevent public access.

3.1.1.2 Fencing

Temporary safety fence, including gates and warning signs, shall be provided along the construction site and at all open excavations and tunnels to control access by unauthorized people and to protect the public from construction activities. The safety fence shall match the base standard color (or bright orange where it protects excavated areas), shall be made of high density polyethylene grid or approved equal or plastic fence from recovered materials containing 60-100 percent recovered content level plastic, a minimum of 42 inches high, supported and tightly secured to steel posts located on minimum 10 foot centers. Remove the fence from the work site upon completion of the contract.

If the Contractor desires for protection of Contractor materials and equipment, enclose the Contractor lay-down area with an 8 foot high chain link fence and gates. Remove the fence upon completion and acceptance of the work.

3.1.1.3 Signs

Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least one sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

3.1.1.4 Traffic Work

All work around/involving roadways, to include roadway excavations and utility crossings, will be conducted in accordance with Manual of Traffic Control Devices. Contractors shall provide and ensure appropriate road closure and detour signs are established as necessary for motor traffic management. All road closures shall be coordinated with the Contracting Officer in advance. Self-illuminated (lighted) barricades shall be provided during hours of darkness. Brightly-colored (orange) vests are required for all personnel working in roadways. Road closures shall require a road closure plan showing the location of signage.

3.2 TEMPORARY WIRING

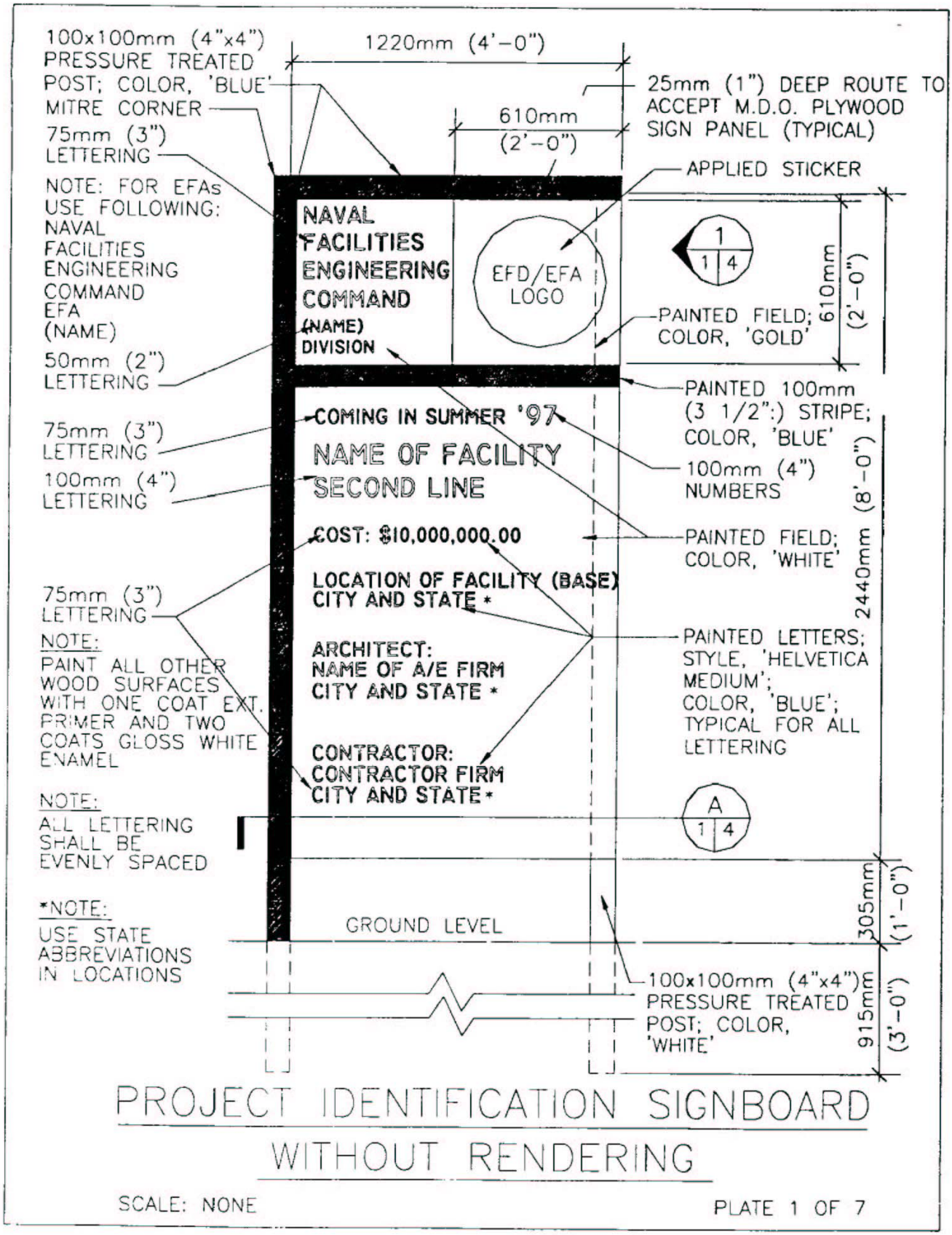
Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

3.3 REDUCED PRESSURE BACKFLOW PREVENTERS

Provide an approved reduced pressure backflow prevention assembly at each location where the Contractor taps into the Government potable water supply.

A certified tester(s) shall perform testing of backflow preventer(s) for proper installation and operation and provide subsequent tagging. Backflow preventer tests shall be performed using test equipment, procedures, and certification forms conforming to those outlined in the latest edition of the Manual of Cross-Connection Control published by the FCCCHR Manual. Test and tag each reduced pressure backflow preventer upon initial installation (prior to continued water use) and quarterly thereafter. Tag shall contain the following information: make, model, serial number, dates of tests, results, maintenance performed, and signature of tester. Record test results on certification forms conforming to requirements cited earlier in this paragraph.

-- End of Section --

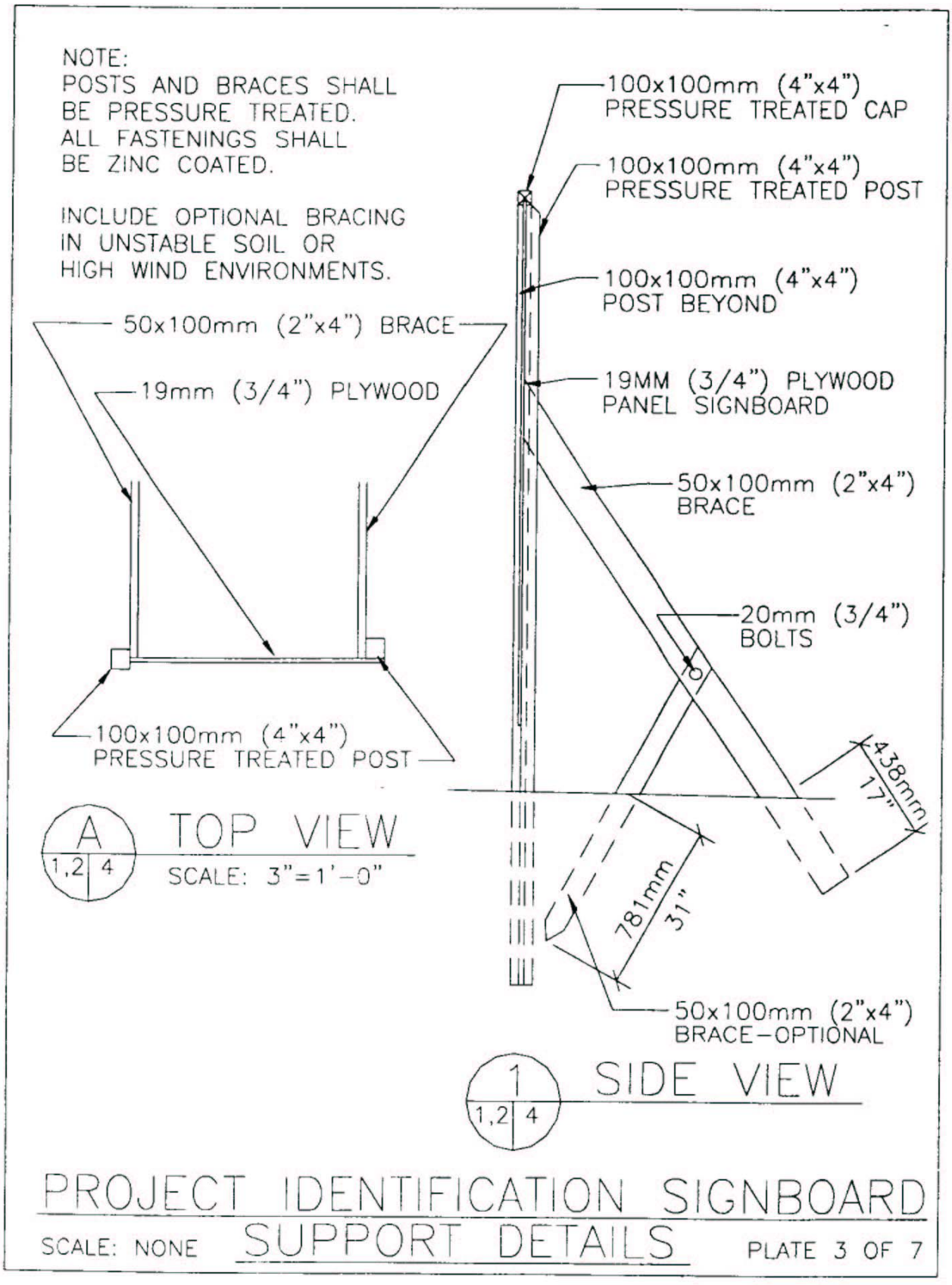


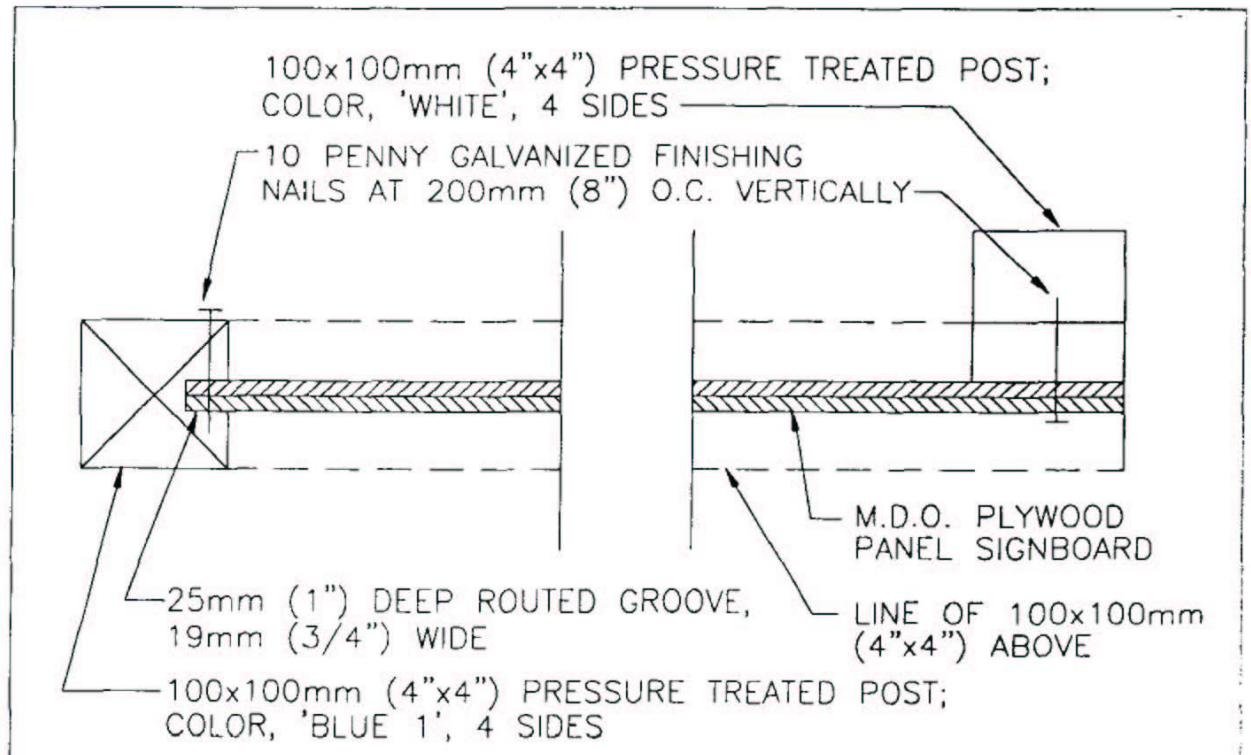
PROJECT IDENTIFICATION SIGNBOARD

WITHOUT RENDERING

SCALE: NONE

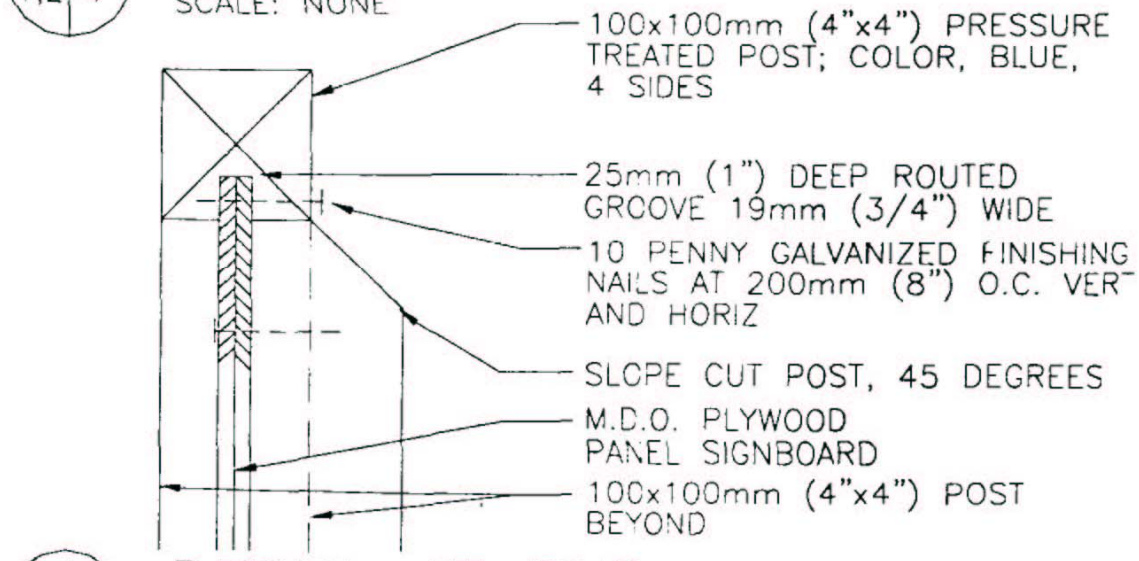
PLATE 1 OF 7


NOTE:
POSTS AND BRACES SHALL BE PRESSURE TREATED.
ALL FASTENINGS SHALL BE ZINC COATED.
INCLUDE OPTIONAL BRACING IN UNSTABLE SOIL OR HIGH WIND ENVIRONMENTS.
50x100mm (2"x4") BRACE
19mm (3/4") PLYWOOD
100x100mm (4"x4") PRESSURE TREATED POST
A
1,2 4
TOP VIEW
SCALE: 3"=1'-0"
100x100mm (4"x4") PRESSURE TREATED CAP
100x100mm (4"x4") PRESSURE TREATED POST
100x100mm (4"x4") POST BEYOND
19MM (3/4") PLYWOOD PANEL SIGNBOARD
50x100mm (2"x4") BRACE
20mm (3/4") BOLTS
45°
438mm 17"
781mm 31"
50x100mm (2"x4") BRACE-OPTIONAL
1
1,2 4
SIDE VIEW
PROJECT IDENTIFICATION SIGNBOARD
SCALE: NONE
SUPPORT DETAILS
PLATE 3 OF 7



A 1,2 4 PLAN SECTION

SCALE: NONE



1 1,2 4 DETAIL AT END

SCALE: NONE

PROJECT IDENTIFICATION SIGNBOARD SECTIONS

PLATE 4 OF 7

SECTION 01526N

SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS FOR DESIGN-BUILD
11/05

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ASME B30.3	(1996) Construction Tower Cranes

ASME INTERNATIONAL (ASME)

ASME B30.22	(2000) Articulating Boom Cranes
ASME B30.5	(2004) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2000) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2005) National Electrical Code
NFPA 70E	(2004) Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1926	Safety and Health Regulations for Construction

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Crane Critical Lift Plan; G

SD-06 Test Reports

Reports

Accident Reports

Monthly Work-Hour Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist; G

Submit one copy of each permit/certificate attached to each Daily Production Report.

1.3 DEFINITIONS

Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload, and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. The checklist will be completed monthly by the Contractor and submitted with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90, will result in a retention of up to 10 percent of the voucher.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with USACE EM 385-1-1, and the following Federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

Site Safety and Health Officer (SSHO) shall perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The assignment of the SSHO contractually does not relieve the Contractor from the regulatory requirements governing safety responsibility. The Contractor Quality Control (QC) person cannot be the SSHO on this project, even though the QC has safety inspection responsibilities as part of the QC duties. The SSHO shall meet the following requirements:

Level 5:

An Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS), and/or Construction Health & Safety Technician (CHST). The ASP, STS, and/or CHST can be a collateral position with the Environmental Manger; however the person in this position must have the following experience and training:

A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects. 30-hour OSHA construction safety class or equivalent within the last 5 years.

An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following 4 areas of competency: Excavation; Scaffolding; Fall Protection; and Hazardous Energy.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)

In addition to duties required in EM 385-1-1, perform the following duties:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors' daily production report.

b. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

Failure to actively apply an acceptable safety program will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

1.7 REPORTS

1.7.1 Accident Reports

a. For recordable injuries and illnesses, and property damage accidents resulting in at least $2,000 in damages, the Prime Contractor shall conduct an accident investigation to establish the

root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) form and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. For any weight handling equipment accident (including rigging gear accidents) the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Crane operations shall not proceed until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer. The Contracting Officer will provide a blank copy of the accident report form.

1.7.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Information shall include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

1.7.3 Monthly Work-Hour Reports

Monthly work-hour reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.8 HOT WORK

Prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, a written permit shall be requested from the Fire Division. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. It is mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

Obtain services from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems, welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, vaults, etc.) that have the potential for flammable or explosive atmospheres.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

The Contractor shall provide permanent signs integral to or securely attached to access covers for permit-required confined spaces provided by this contract. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER" in bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 5 feet.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

The Contractor shall comply with USACE EM 385-1-1, NFPA 241, the APP, the AHA, Federal and/or State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard shall prevail.

3.1.1 Hazardous Material Use

Each hazardous material must receive approval prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos. If additional material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 work days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage, and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor

shall attend a pre-outage coordination meeting with the Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

The Contractor shall establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. The program shall include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.3.1 Fall Protection for Roofing Work

Fall protection controls shall be implemented based on the type of roof being constructed and work being performed. The roof area to be accessed shall be evaluated for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs: A safety monitoring system is not adequate fall protection and is not authorized.

b. Steep-Sloped Roofs: Work on steep-sloped roofs requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3.4 EQUIPMENT

3.4.1 Weight Handling Equipment

a. Crane Critical Lift Plan: Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. The plan shall be submitted 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.C.18. and, for lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.550(g).

b. Certificate of Compliance: The Contractor shall provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). Certificate shall state that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance shall comply with 29 CFR 1926 and USACE EM 385-1-1 section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. The Contractor shall also certify that all of its crane operators working on the DOD activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). These certifications shall be posted on the crane.

c. The Contractor shall notify the Contracting Officer 15 days in advance of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Conference. Contractor's operator shall remain with the crane during the spot check.

d. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed in accordance with the manufacturer's recommended procedures.

e. The Contractor shall comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

f. Under no circumstance shall a Contractor make a lift at or above 90% of the cranes rated capacity in any configuration.

g. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and shall follow the requirements of USACE EM 385-1-1 section 11 and ASME B30.5 or ASME B30.22 as applicable.

h. The Contractor shall use cribbing when performing lifts on outriggers.

i. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

j. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

k. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

l. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

m. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. Prior to conducting lifting operations the Contractor shall set a maximum wind speed at which a crane can be safely operated based on the equipment being used, the load being lifted, experience of operators and riggers, and hazards on the work site. This maximum wind speed determination shall be included as part of the activity hazard analysis plan for that operation.

3.5 EXCAVATIONS

3.5.1 Utility Locations

All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract. Locate utilities in accordance with Section 01141N, WORK RESTRICTIONS FOR DESIGN-BUILD

3.5.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.6 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with station utility departments in addition to a private locating service. Outages to isolate utility systems shall be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.7 ELECTRICAL

3.7.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash

protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

3.8 WORK IN CONFINED SPACES

In addition to the requirements of Section 06.I of USACE EM 385-1-1, OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b)(6) the Contractor shall comply with the following. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.06 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

-- End of Section --

SECTION 01571N

ADDITIONAL TEMPORARY CONTROLS
03/06

PART 1 GENERAL

1.1 CITIZENSHIP

All employees working at Stennis Space Center, MS shall be citizens of the United States.

1.2 PERSONNEL AND VEHICLE ACCESS

The Contractor shall be required to obtain Contractor tradesman passes for all personnel to access the Installation and Government property. Provide a list of employees (prime and subcontractors) on company letterhead for clearance into the project work area. The list shall be provided to the Contracting Officer a minimum of 5 working days prior to scheduled work to be performed. Additionally, the list shall be maintained and updated a minimum of 5 working days prior to the time new employees need access to the jobsite. The list shall contain the contract number and the full employee name, date of birth, place of birth, and citizenship of each employee.

The Contractors request for badges shall be given to the Contracting Officer or his representative prior to issuance of any badges and passes. All persons shall show one proof of identification (pictured driver's license, pictured State ID card, birth certificate, U.S. Citizenship certificate). It is the Contractor's responsibility to provide any modifications and/or request changes to the request for badges as conditions change. The Contractor is responsible for and shall ensure the return of all passes/badges to the Contracting Officer upon termination of contract and/or changes in employment. All Contractor employees shall wear passes on the front left-hand side of the outer garment, between the shoulder and the waistline so it is plainly visible at all times while entering, working on, and departing the Installation. Failure to display passes is considered a violation of Base Security Regulations and will result in their confiscation. Repeated violations may result in permanent debarment from the Installation. Pass processing lasts approximately fifteen minutes per individual. However, the Security Pass and ID Office processes individuals on a first-come, first-served basis. Processing might be delayed. All Contractor-owned vehicles shall be marked with their Company name at all times while entering, operating on, or departing the Installation. For those Contractor personnel needing a badge for longer than 180 total days, additional information is required. The Contracting Officer will provide this information/guidance to the Contractor.

1.3 HAZARDOUS OPERATIONS PERMIT

Prior to performing any "hot work" (welding, burning, lead melting, blow torches, tar pots, and similar flame producing operations), obtain a Hazardous Operations Permit from the Station Fire Department, via the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01573N

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT FOR DESIGN-BUILD
10/05

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction, and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.2 PLAN

A waste management plan shall be submitted within 15 days after notice to proceed and prior to initiating any site preparation work. The plan shall include the following:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation.

c. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.

d. Characterization, including estimated types and quantities, of the waste to be generated.

e. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

f. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.

g. List of specific waste materials that will be salvaged for resale, salvaged and reused, or recycled. Recycling facilities that will be used shall be identified.

h. Identification of materials that cannot be recycled/reused with an explanation or justification.

i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

1.3 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

1.4 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.4.1 Reuse

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

1.4.2 Recycle

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.4.3 Waste

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01575N

TEMPORARY ENVIRONMENTAL CONTROLS
03/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI Guideline K	(1997) Containers for Recovered Fluorocarbon Refrigerants

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1200	Hazard Communication
49 CFR 178	Shipping Container Specification

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 832-R-92-005	Storm Water Management for Construction Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
40 CFR 112	Oil Pollution Prevention
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

40 CFR 266	Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Universal Waste Management
40 CFR 279	Used Oil Regulations
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	EPA Toxic Chemical Release Reporting Regulations
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shipments and Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Discarded material (except hazardous waste, hazardous construction debris, regulated waste, and industrial waste as defined in paragraphs entitled "Hazardous Waste", "Hazardous Construction Debris", "Regulated Waste" and "Industrial Waste", including solid, liquid, semisolid, or contained gaseous materials.

a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

b. Construction and Demolition Debris: Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or

sludge is also subject to regulation as construction and demolition debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

(1) Surplus Soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.

(2) Inert Construction and Demolition Debris: Broken or removed concrete, masonry products, asphalt paving materials; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments.

(3) Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard, pallets, dunnage, and formwork. Wood painted with lead based paint is not included unless the waste stream determination indicates that the wastes are non-hazardous.

(4) Scrap Metal: Scrap and excess ferrous and non-ferrous metals such as re-enforcing steel, structural shapes, pipe and wire, banding straps, fastners, shipping spreaders, door and window frames that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included, except where specific exemptions allow recycling.

(5) Empty Cans: Metal or plastic cans that are empty of chemicals, paints, solvents, thinners, and adhesives. A container is empty if all contents have been removed using practices commonly employed to remove materials from that type container, e.g., pouring, pumping, and aspirating. Air-drying of cans is not permitted. Aerosol cans are not included if pressurized.

(6) Recyclables/Reusable Material: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may be included as recyclable if sold to a scrap metal company. Paint cans may be included as recyclable if sold to a scrap metal company.

Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

Where state or local regulatory definitions for waste differ from those stated in this section, the state or local definitions shall be used for this contract.

1.2.3 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.4 Hazardous Waste

A waste as defined in 40 CFR 261, or as defined by applicable State and local regulations. May include, but is not limited to, hazardous construction and demolition debris, unusable special coatings, lead containing paint, spent solvents, and rags contaminated with hazardous materials.

1.2.4.1 Hazardous Construction and Demolition Debris

As defined in paragraph entitled "Construction and Demolition Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261.

1.2.4.2 Universal Waste

Specific hazardous wastes defined by 40 CFR 273 or by applicable State and local regulations. The categories of these wastes are Batteries, Pesticides, Thermostats, and Lamps. Common items that are managed as Universal Wastes include, but is not limited to, spent lead-acid batteries, nickel-cadmium rechargeable batteries, NiMH (nickel-metal-hydride) batteries, lithium ion batteries, fluorescent lamps, high intensity discharge lamps, neon lamps, mercury vapor lamps, high pressure sodium lamps, metal halide lamps, and thermostats containing mercury ampoules.

1.2.5 Industrial Wastes

Solid waste or waste by-products containing hazardous constituents that are generated incidental to or derived from construction and demolition activities. Items included in this category include, but are not limited to, used rags, cleaning materials and residue, used protective sheeting (paper or plastic), unusable partially filled paint cans or coating containers, paint brushes and rollers, disposable personal protective equipment (PPE) not used in asbestos or lead removal, and non-hazardous pressurized aerosol cans. This category does not include construction and demolition debris or any other discarded materials designated as regulated waste or hazardous waste.

1.2.5.1 Petroleum Contaminated Waste

Surface water, groundwater, soil, or sediment that has the presence of petroleum or petroleum products or their chemical constituents (except hazardous waste as defined in the paragraph entitled "Hazardous Waste") in quantities that exceed the applicable cleanup target levels.

1.2.6 Regulated Waste

Those wastes, other than Hazardous Wastes and Industrial Wastes, that have specific additional Federal, state, or local regulatory requirements for handling, storage, or disposal. Includes, but is not limited to, asbestos containing materials and PCB contaminated materials.

1.2.7 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.2.8 Hazardous Materials

Any material that is regulated as a hazardous material in accordance with 49 CFR 171, 49 CFR 172, and 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous substances.

1.3 SUBMITTALS

Submit the following in accordance with Section 01331, DESIGN SUBMITTAL PROCEDURES, and Section 01332, CONSTRUCTION SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Contractor and Sub-Contractor Company Name list for ECATTS; G

Environmental Protection Plan; G

Pre-construction Survey; G

Dirt and Dust Control Plan; G

Certifying Professional Engineer Data; G

Licenses and Permits; G

Hazardous Materials List; G

Waste Stream Determination Documentation; G

Waste stream determination documentation or waste profile

Laboratory Analysis and Accreditation Certificate/License; G

Solid Waste Disposal Permit

Contractor 40 CFR Employee Training Records

SD-06 Test Reports

Laboratory analysis

SD-07 Certificates

Regulatory Notification; G

Solid Waste Disposal Report

Contractor Hazardous Material Inventory Log; G

Stormwater Pollution Prevention Plan; G

Erosion And Sediment Control Inspection Reports

Field Report(s); G

Construction completion certifications; G

SD-11 Closeout Submittals

Disposal Documentation For Hazardous And Regulated Waste; G

Notice of Termination; G

Environmental Records Binder; G

1.4 REPORTS

1.4.1 Pre-construction Survey

Perform a pre-construction survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions on and adjacent to the site. Include this survey as a part of the Environmental Protection Plan as prescribed elsewhere in this section.

1.4.2 Dirt and Dust Control Plan

Prepare a map showing truck and material haul routes along with a plan for controlling and removing dirt and debris from base roadways. As a minimum, identify in the plan the equipment to be used for cleaning along the haul route and measures to reduce dirt and debris accumulation on roadways. Identify who is responsible for cleaning up dirt and debris. Identify other operations that will generate dust and describe the controls planned for dust control. Include this plan as a part of the Environmental Protection Plan as prescribed elsewhere in this section.

1.4.3 Certifying Professional Engineer Data

Submit the name, address, telephone number, registration number, and state of registration for all Professional Engineers that will inspect and certify work performed under this contract. Certifications include, but are not limited to, construction permits completion certificate.

1.4.4 Licenses and Permits

Submit copies of all licenses and permits obtained for this project, including related correspondence, to the Contracting Officer. Related correspondence includes, but is not limited to, application forms, drawings, and letters to and from appropriate agencies.

1.4.5 Hazardous Materials List

The Contractor is required by specification Section 01526, SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS FOR DESIGN-BUILD, to prepare and include in the Accident Prevention Plan an inventory of Hazardous Materials to be used during this contract with estimated quantities and copies of Material Safety Data Sheets (MSDS). This data shall be called the Hazardous Materials List, submit this list for approval prior to bringing hazardous materials on Base.

1.4.6 Waste Stream Determination Documentation

The Contractor shall complete a Waste Stream Determination Documentation form or Waste Profile for all wastes to be generated. (Copies of forms are attached at the end of this section. If there are base specific forms, they will be provided at the pre-construction conference.) Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, industrial waste, or regulated waste. The waste stream determination must be based upon the following: a constituent listing from the manufacturer or visual identification of waste, combined with consideration of the process by which the waste was generated and any laboratory analysis necessary to complete the determination. Material Safety Data Sheets (MSDS) by themselves are not adequate. The Contractor shall bear the cost of the waste stream determinations.

A Waste Stream Determination Documentation form must be provided for wastes resulting from construction, renovation, and demolition activities and/or the use of products such as the following (this listing is not all inclusive): oil and latex based paints and caulking, solvents, adhesives, aerosols, petroleum based materials, and all original product containers.

1.4.6.1 Laboratory Analysis and Accreditation Certificate/License

Submit a copy of a laboratory analysis of waste and debris used to support any waste determination. Analysis must use EPA approved methods. Laboratories shall be accredited by the appropriate national accreditation authority described in Section 01451N, DESIGN AND CONSTRUCTION QUALITY CONTROL and licensed in the jurisdiction where the work is to be performed if required by state or local regulation. Submit the certificate of accreditation and license to the Contracting Officer for approval.

1.4.7 Solid Waste Disposal Permit

Submit one copy of a permit or license showing the appropriate agency(s) approval of the disposal plan before transporting wastes off Government property.

1.4.8 Contractor 40 CFR Employee Training Records

Prepare and maintain employee-training records throughout the term of the contract meeting applicable 40 CFR requirements. Submit these training records prior to the start of the activity requiring the training.

1.4.9 Regulatory Notification

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations and permits obtained by the Contractor and Contracting Officer. The Contractor shall submit notification documents via the Contracting Officer to regulatory agencies, allowing the appropriate agency processing time prior to the scheduled commencement of work activities and 5 additional days for the Contracting Officer. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint), the installation of or removal of petroleum storage tank systems, and the installation, replacement, or removal of equipment that generate air emissions, such as paint booths, boilers, emergency generators, etc.

1.4.10 Solid Waste Disposal Report

Monthly the Contractor shall submit a solid waste disposal report to the Contracting Officer. For each waste stream, the report shall state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. The Contractor shall include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste, signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification shall include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor shall submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received shall not be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

1.4.11 Contractor Hazardous Material Inventory Log

Submit a "Contractor Hazardous Material Inventory Log" to the Contracting Officer on the 10th day of each month for the preceding month. (Copies of forms are attached at the end of this section. If there are base specific forms, they will be provided at the pre-construction conference.) This form provides information required by the Environmental Protection Community Right-to-Know Act (EPCRA). Attach a copy of the Material Safety Data Sheet (MSDS) for each item listed and maintain a file copy of these logs and MSDSs at the job-site at all times in the Environmental Records Binder.

Submit a copy of all previous logs and MSDSs at the end of construction, or December 31 of each calendar year during the life of the contract which ever comes first.

Hazardous Materials are defined in paragraph 1 of this section. Typical types of materials requiring MSDSs and quantity reporting include, but are not limited to, acids, adhesives, alkalies/bases/caustics, cleaning compounds, compressed gases, corrosion prevention compounds, detergents/soaps, greases, hydraulic fluids, inspection penetrants,

lubricants /oils, paint materials, polish/wax compounds, solvents, water test/treatment chemicals, oxidizers, fuels, batteries, pesticides, aerosol can products, admixtures, curing compounds, and other petroleum-based products.

Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

1.4.12 Storm Water Pollution Prevention Plan (SWPPP)

Prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) to meet the requirements of the State of Mississippi general permit for storm water discharges from construction sites.

Submit the SWPPP along with any required Notice of Intents (NOI), via the Contracting Officer, to the appropriate State agency for approval, a minimum of 20 calendar days prior to the start of construction.

The approved SWPPP shall become a part of the Environmental Protection Plan prescribed elsewhere in this section and shall be kept at the construction on-site office. Continually update the SWPPP as regulations require to reflect current site conditions.

Submit Notice of Termination (NOT), via the Contracting Officer, to the appropriate State agency for approval, after completion of soil disturbing activities and final stabilization is achieved, but prior to final acceptance.

1.4.12.1 Erosion and Sediment Control Inspection Reports

Submit "Erosion and Sediment Control Inspection Reports" (copies of the form is attached at the end of this section or base specific forms will be provided at the pre-construction conference) to the Contracting Officer once every 7 calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain.

1.4.13 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA and State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.5 ENVIRONMENTAL RECORDS BINDER

Maintain on-site, a separate three-ring binder(s) with approved copies of all submittals required in this section and submit at the completion of construction.

1.6 CLASS I ODS PROHIBITION

Class I ODS as defined and identified herein will not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition will be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.7 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Each Contractor and Sub-contractor performing construction work on this project shall complete "Environmental Compliance Assessment Training and Tracking System (ECATTS)" training. This training is web-based and can be accessed from any computer with Internet access using the following instructions. NOTE: Prior to registration and completion of training the Contractor or Sub-Contractor Company Name and Contract Number must be in the training database. Contractors shall submit a list of Company Names of all sub-contractors (Contractor and Sub-Contractor Company Name list) doing work on this Contract Number to the Contracting Officer immediately after award of a contract. This list shall be updated and re-submitted as sub-contracts are awarded.

NAVFAC Southeast's Environmental Compliance Assessment and Training System

HOW TO REGISTER FOR NAVFAC Construction TRAINING

Log on to http://icldnv.ecatts.com/
At the Welcome page, click **Enter**
In the New Users box, enter the registration password: **efdsouth**
Click **Create an Account**
Step 1 - Your Name and Contact Information: Enter the requested information (please include an e-mail address if you have one in case you forget your password and to get notification of updated training) and click **Next Step**
Step 2 - Account Information: Enter the requested information and click **Next Step**
Step 3 - User Type
From the drop down menu, select ROICC Training
click **Next Step**
Select the NAVFAC Construction User Type that describes the type work that your company is performing on this contract
click **Next Step**
Step 4 - Organizational Information
From the drop down menu, select the ROICC Office managing your contract
From the drop down menu, select your Company Name
Enter your employee ID (optional - DO NOT ENTER your Social Security No.)
click **Next Step**
Step 5 - User Agreement: Read the User Agreement and click **I Agree - Complete Registration**
On the next screen, click **Continue**
You will be directed to the Log In page. You can now log in to the ECATT system using the User ID and password you selected in Step 1 and begin the training by clicking on **Go To My Training Modules**.

Personnel in the positions listed below shall complete ECATTS Training prior to starting their respective portions of on-site work under this contract. If personnel changes occur for any of these positions after starting work,

replacement personnel shall complete ECATTS training within 14 days of assignment to the project.

Prime Contractor
- Project Manager
- Project Superintendent
- Quality Control Manager
- Environmental Manager (as specified in this specification)

Sub-Contractors
- Project Manager (or equivalent office person)
- Superintendent (or equivalent job-site person)

The Contractor and each subcontractor performing work on this project shall have a letter on file in the Environmental Records binder at the job site certifying that all required personnel have completed this training.

This training has been structured to allow contractors to receive credit under this contract for ECATTS training from previous NAVFAC Southeast construction contracts containing these requirements and also to carry forward credit to future contracts. Contractors or sub-contractors shall ensure that all personnel review their training plans for new modules or updated training requirements prior to beginning work. Some training modules are tailored for specific State regulatory requirements, therefore, Contractors working in multiple states will be required to re-take modules tailored to the state where the contract work is being performed.

1.7.1 Facility Hazardous Waste Generator Status

The Navy SOF Facilities, Stennis Space Center, Mississippi is designated as a Small Quantity Generator. All work conducted within the boundaries of this activity must meet the regulatory requirements of this generator designation. The Contractor will comply with all provisions of Federal, State and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of all construction derived wastes.

1.7.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause except for the following permits which will be obtained by the Contracting Officer:

None

For Contractor obtained permits, submit all permit applications, via the Contracting Officer, to the applicable Federal, State, or Local agency.

The Contractor shall submit start of construction notifications, perform quality control inspections of the work in progress, and submit construction completion certifications to the applicable regulatory agency, via the Contracting Officer, for all permits, including those obtained by the government.

The inspections and construction completion certifications shall be provided through the services of a Professional Engineer, registered in the State where the work is being performed. The Certifying Engineer shall prepare a

Field Report for each inspection and submit to the Contracting Officer as an attachment to the Contractors Production Report.

Each permit shall be a Definable Feature of Work (DFOW) and shall be included in the Network Analysis Schedule. The scheduled activities shall include, but not be limited to, application preparation and submission, government review and agency processing time, regulatory notifications, Certifying Engineer inspections, and construction completion certification submission.

1.7.3 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and the station are subject to Federal, State, and local regulatory agency inspections to review compliance with environmental laws and regulations. The Contractor shall fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and shall provide immediate notification to the Contracting Officer, who will accompany them on any subsequent site inspections. The Contractor shall complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, State and local laws and regulations. The Contractor shall immediately notify the Contracting Officer if a Notice of Violation (NOV) is issued to the Contractor.

The Contractor shall be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, State or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, State or local environmental law or regulation. Should a Notice of Violation (NOV), Notice of Noncompliance (NON), Notice of Deficiency (NOD), or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor shall fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.8 ENVIRONMENTAL MANAGER

The Contractor shall appoint in writing an Environmental Manager for the project site. The Environmental Manager shall be directly responsible for coordinating contractor compliance with Federal, State, local, and activity environmental requirements. This can be a collateral position with the Site Safety and Health Officer; however the person in this position must be trained to adequately accomplish the following duties:

The Environmental Manager shall implement the Environmental Protection Plan; ensure that all environmental permits are obtained, complied with, and closed out; ensure compliance with Storm Water Management regulations and inspection requirements; ensure compliance with Hazardous Materials storage, handling, and reporting requirements; and shall coordinate any remediation of regulated substances (lead, asbestos, PCB, etc).

The Environmental Manager shall ensure waste segregation and storage compatibility requirements are met; ensure compliance with Hazardous Waste

identification, handling, storage, manifesting, and disposal requirements; inspect and manage Waste Accumulation areas, if required; ensure only authorized personnel add wastes to containers; ensure all Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; and coordinate removal of waste containers.

The Environmental Manager shall maintain the Environmental Records binder.

1.9 ENVIRONMENTAL PROTECTION PLAN

Meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan will be submitted in the following format and will, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources" in this section):

a. Description of the Environmental Protection Plan

(1) General overview and purpose

(2) General site information, include Pre-Construction site survey

(3) A letter signed by an officer of the firm appointing the Environmental Manager and stating that he/she is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

b. Protection of Natural Resources

(1) Land resources

(2) Tree protection

(3) Replacement of damaged landscape features

(4) Temporary construction

(5) Stream crossings

(6) Fish and wildlife resources

(7) Wetland areas

c. Protection of Historical and Archaeological Resources

(1) Objectives

(2) Methods

d. Storm Water Management and Control, address the following as a minimum:

(1) Ground cover

(2) Erodible soils

(3) Temporary measures

(a) Mechanical retardation and control of runoff

(b) Vegetation and mulch

(c) Sediment Basins

(4) Include the approved Stormwater Pollution Prevention Plan (SWPPP), prescribed elsewhere in this section, here. The plan shall follow the appropriate regulatory agency format and contain, at a minimum, the following:

(a) Description of the site and potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

(b) A map showing site drainage, discharge points, location of control measures.

(c) Describe the control measures to be used. Use "Best Management Practices" (BMP) from EPA 832-R-92-005

(d) Describe the inspection procedures and reports.

(e) Describe maintenance procedures for control measures during the life of the contract.

e. Dirt and Dust Control

Include the approved Dirt and Dust Control Plan here.

f. Prevention of Spills and Releases to the Environment

(1) Procedures to prevent spills and releases to the environment

(2) Notifications in the event of a spill or release to the environment

g. Pollution Prevention and Hazardous Waste minimization

(1) Procedures to reduce potential for Hazardous Waste generation.

(2) Protection of the Environment from Waste generated during Construction/Renovation and Demolition Operations

h. Control and disposal of solid waste

i. Control and disposal of construction and demolition debris

j. Control and disposal of Hazardous Waste, Universal Waste, and Hazardous Construction and Demolition Debris (see Hazardous Waste Management Section).

This item shall consist of the management procedures for all hazardous waste to be generated. As a minimum, include the following:

(1) Procedures to be employed to ensure a written waste stream determination or waste profile is made for all wastes which are to be generated

(2) Sampling/analysis plan for waste stream determination

(3) Methods of accumulation (i.e., in tanks and/or containers) and designation of individual responsible for waste accumulation sites

(4) Management procedures for identification, storage, labeling, transportation, and disposal of hazardous waste and universal waste (treatment of waste is not allowed unless specifically noted)

(5) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268)

(6) Management procedures for recyclable hazardous materials

(7) Used oil and used oil filter management procedures in accordance with 40 CFR 279

(8) Plans for the disposal of hazardous waste by permitted facilities

(9) Procedures to be employed to ensure all required employee training records are maintained

k. Control and disposal of Industrial Waste, including petroleum contaminated waste

l. Control and disposal of Regulated Waste

1.9.1 Environmental Protection Plan Review

Fourteen days after the environmental protection plan meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work will not begin until the environmental protection plan has been approved.

1.10 UNFORESEEN HAZARDOUS OR REGULATED MATERIAL

All known hazardous or regulated materials are indicated in the contract documents. If material that is not indicated in the contract documents is encountered that may be dangerous to human health upon disturbance during construction operations, stop that portion of work and notify the Contracting Officer immediately. Intent is to identify materials such as PCB, lead paint, mercury, petroleum products, and friable and non-friable asbestos. Within 14 calendar days the Government will determine if the material is hazardous. If the material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If the

material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor will be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees, which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Stream Crossings

The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition or as indicated or as specified.

3.1.2.2 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be

impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.1.3 Fish and Wildlife Resources

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

3.3.1 Burnoff

Burnoff of the ground cover is not permitted.

3.3.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.3.3 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

3.3.3.1 Mechanical Retardation and Control of Runoff

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and straw bales to retard and divert runoff to protected drainage courses.

3.3.3.2 Vegetation and Mulch

Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of

wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste from Government property and dispose off-site at an approved location or facility. Solid waste disposal off-site must comply with the most stringent local, State, or Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

3.4.1 Dumpsters

Equip dumpsters with a secure cover. Keep cover closed at all times, except when being loaded with trash and debris. Locate dumpsters behind the construction fence or out of the public view. Empty site dumpsters at least once a week or as needed to keep the site free of debris and trash. If necessary, provide 55 gallon trash containers to collect debris in the construction site area. Locate the trash containers behind the construction fence or out of the public view. Empty trash containers at least once a day. For large demolitions, large dumpsters without lids are acceptable but should not have debris higher than the sides before emptying.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris and Universal Waste Management

The Contractor shall identify all construction activities which will generate hazardous waste, hazardous construction and demolition debris, and universal wastes. The Contractor shall provide a documented waste determination for all resultant waste streams. Hazardous waste, hazardous c&d debris, and universal wastes shall be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Hazardous waste shall also be managed in accordance with the approved "Control and Disposal of Hazardous Waste, Universal Waste, and Hazardous Construction and Demolition Debris" Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities shall be identified as being generated by the Government. Prior to Contractor removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste shall be brought onto Government property.

Provide to the Contracting Officer a copy of waste stream determination documentation or waste profile for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Hazardous Waste/Industrial Waste/Regulated Waste Storage Areas

If the work requires the temporary storage/collection of regulated or hazardous wastes, the Contractor shall request the establishment of a Regulated Waste Storage Area, a Satellite Accumulation Area, or a 90 Day Storage Area at the point of generation. The Contractor shall submit a request in writing to the Contracting Officer providing the following information:

Contract Number	_____	Contractor	_____
Responsible Individual	_____	Phone Number	_____
Type of Waste	_____	Source of Waste	_____
Emergency POC	_____	Phone Number	_____

Location of the Site: _____
(Attach Site Plan to the Request)

Attach a waste stream determination form or waste profile. Allow ten working days for processing this request.

3.6 CONTROL AND DISPOSAL OF INDUSTRIAL WASTES

3.6.1 Industrial Waste Management

The Contractor shall identify all construction activities which will generate industrial waste. The Contractor shall provide a documented waste stream determination or waste profile for all resultant waste streams. Industrial waste shall be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations. Industrial waste shall also be managed in accordance with the approved "Control and Disposal of Industrial Waste" Section of the Environmental Protection Plan. Store industrial waste in approved containers. Industrial waste generated within the confines of Government facilities shall be identified as being generated by the Government. Prior to Contractor removal of any industrial waste from Government property, all shipping documents must be signed by activity personnel from the Base Environmental Office. No industrial waste shall be brought onto Government property. Provide to the Contracting Officer a copy of waste stream determination documentation or waste profile for any solid waste streams that have any potential to be industrial waste. For industrial waste spills, verbally notify the Contracting Officer immediately.

3.7 CONTROL AND DISPOSAL OF REGULATED WASTES

3.7.1 Regulated Waste Management

The Contractor shall identify all construction activities, which will generate regulated waste. The Contractor shall provide a documented waste stream determination or waste profile for all resultant waste streams. Regulated waste shall be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations. Regulated waste shall also be managed in accordance with the approved "Control and Disposal of Regulated Waste" Section of the Environmental Protection Plan. Store regulated waste in approved containers. Regulated waste generated within the confines of Government facilities shall be identified as being generated by the Government. Prior to Contractor removal of any regulated waste from Government property, all waste shipment records, manifests, or shipping documents must be signed by activity personnel from the Station Environmental Office. No regulated waste shall be brought onto Government property. Provide to the Contracting Officer a copy of waste stream determination documentation or waste profile for any solid waste streams

that have any potential to be regulated waste. For regulated waste spills, verbally notify the Contracting Officer immediately.

3.8 POLLUTION PREVENTION AND HAZARDOUS WASTE MINIMIZATION

The Contractor shall actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on base. The Environmental Protection Plan shall include the Contractor's procedures for pollution prevention and hazardous material minimization. For preparing this part of the plan, the Contractor may request information from the Contracting Officer and obtain a copy of the activity's pollution prevention and hazardous material minimization plan for reference material. The Contractor shall describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.9 PETROLEUM PRODUCTS

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site will be managed in accordance with 40 CFR 279. The Contractor will determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste. All hazardous waste will be managed in accordance with the paragraph entitled "Hazardous Waste/Debris and Universal Waste Management" of this section and in accordance with the approved Environmental Protection Plan.

3.10 RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES

Take precautions to prevent releases/spills of oil and hazardous materials. In the event of any releases of oil and hazardous materials, chemicals, or gases; immediately (within 15 minutes) notify the Base or Activity Fire Department, and the Contracting Officer. The Base Environmental Office shall make verbal and written notifications as required by the federal 40 CFR 355, State, local regulations and Navy Instructions. The Contractor shall collect and provide information as needed to the Contracting Officer. Spill response shall be in accordance with 40 CFR 300 and applicable State and local regulations. Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor shall reimburse the Government for such assistance.

3.11 HAZARDOUS MATERIAL CONTROL

The Contractor is required by specification Section 01526, SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS FOR DESIGN-BUILD, to include hazardous material control procedures in the Accident Prevention Plan. The procedures shall address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements. The Contractor shall also ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor shall ensure that all containers of hazardous materials have NFPA labels or their equivalent. The Contractor shall certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261.

3.12 OZONE DEPLETING SUBSTANCES CONTROL AND MANAGEMENT

Prevent discharge of Class I and Class II ODS to the atmosphere.

3.12.1 Air Conditioning Equipment

Remove air conditioning equipment identified for removal without releasing chlorofluorocarbon refrigerants to the atmosphere in accordance with the Clean Air Act Amendment of 1990.

Recover all refrigerants prior to removing air conditioning equipment and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)". Turn in salvaged Class I ODS refrigerants as specified in paragraph, "Turn-In Of Class I ODS".

3.12.2 Cylinders and Canisters

Remove all fire suppression system cylinders and canisters and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)."

3.12.3 Disposal of Ozone Depleting Substance (ODS)

Remove and capture all Class I ODS refrigerants in accordance with the Clean Air Act Amendment of 1990, and turn in to the Navy by shipping the refrigerant container to the Defense Logistics Agency at the following address:

Defense Depot Richmond VA (DDVA)
SW0400
Cylinder Operations
800 Jefferson Davis Highway
Richmond, VA 23297-5000

3.12.3.1 Special Instructions

Each container shall have in it no more than one type of ODS. A warning/hazardous label shall be applied to the containers in accordance with Department of Transportation regulations. All cylinders including but not limited to fire extinguishers, spheres, or canisters containing an ODS shall have a tag with the following information:

a. Activity name and unit identification code

b. Activity point of contact and phone number

c. Type of ODS and pounds of ODS contained

d. Date of shipment

e. Naval stock number (for information, call (804) 279-4525)

3.12.3.2 Fire Suppression Containers

Fire suppression system cylinders and canisters with electrical charges or initiators shall be deactivated prior to shipment. Also, safety caps shall be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.12.3.3 Transportation Guidance

Shipment of all ODS containers shall be in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.13 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.14 ABRASIVE BLASTING

3.14.1 Blasting Operations

The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive, agent, paint chips, and other debris. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.14.2 Disposal Requirements

Submit analytical results of the debris generated from abrasive blasting operations per paragraph entitled Laboratory Analysis of this section. Hazardous waste generated from blasting operations will be managed in accordance with paragraph entitled "Hazardous Waste/Debris and Universal Waste Management" of this section and with the approved Environmental Protection Plan. Disposal of non-hazardous abrasive blasting debris will be in accordance with paragraph entitled, "Control and Disposal of Solid Wastes" of this section.

3.15 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

-- End of Section --

Waste Stream Identification No.: _____
Base Process Identification No.: _____
Hazardous Waste Codes: _____

Waste Stream Documentation Form

A. GENERAL INFORMATION

Activity:	Building No.:
Work Center/Shop:	Work Center Phone No.:
Work Center Contact (Name and Title):	
Waste Stream Name:	

B. PROCESS INFORMATION

Process Generating the Waste:	
Waste Generation Rate:	

HSMS PROCESS INFORMATION

Process Code:	Name:
Class:	Subclass:

INPUT MATERIAL(S)

Name	NSN	HMIS MSDS No.

Waste Stream Identification No.: _____
Base Process Identification No.: _____
Hazardous Waste Codes: _____

Waste Stream Documentation Form

C. WASTE STREAM DETERMINATION

Section Based on:

☐ User Knowledge (Process evaluation, MSDSs, and interviews) Date: _____
☐ Waste Analysis Date: _____

Is the waste a "solid waste" according to 40 CFR 261.2?	☐ Yes	☐ No
If no, specify exclusion or exemption by regulatory citation and describe:		
Is the solid waste excluded or exempted from being a hazardous waste?	☐ Yes	☐ No
If yes, specify exclusion or exemption by regulatory citation and describe:		
Is the waste a listed hazardous waste?	☐ Yes	☐ No
F-listed per 40 CFR 261.31?	☐ Yes	☐ No
Waste code(s):		
Detail on why or why not.		
K-listed per 40 CFR 261.32	☐ Yes	☐ No
Waste code(s):		
Detail on why or why not.		
P-listed per 40 CFR 261.33?	☐ Yes	☐ No
Waste code(s):		
Detail on why or why not.		
U-listed per 40 CFR 261.33?	☐ Yes	☐ No
Waste code(s):		
Detail on why or why not.		
Is the waste a characteristic hazardous waste?	☐ Yes	☐ No
Ignitable per 40 CFR 261.21?	☐ Yes	☐ No
Waste code(s):		
Detail on why or why not.		
Corrosive per 40 CFR 261.22?	☐ Yes	☐ No

Waste Stream Identification No.: _____
Base Process Identification No.: _____
Hazardous Waste Codes: _____

Waste Stream Documentation Form

Waste code(s):			
Detail on why or why not.			
Reactive per 40 CFR 261.23?	☐ Yes	☐ No	
Waste code(s):			
Detail on why or why not.			
Toxic per 40 CFR 261.24?	☐ Yes	☐ No	
Waste code(s):			
Detail on why or why not.			
Is the average volatile organic concentration ≥ 500 ppmw?	☐ Yes	☐ No	☐ Potential
Detail on why or why not.			

D. WASTE STORAGE, TREATMENT, AND DISPOSAL

Specific description of waste management from generation point to final disposition.				
Storage Method:	☐ Tank	☐ Drum	☐ Other _____	☐ NA
Capacity:				
Material of Construction:				
DOT Approved:	☐ Yes	☐ No		
Are Land Disposal Restrictions (LDR) applicable?	☐ Yes	☐ No		
Detail on why or why not.				
Are Universal Treatment Standards (UTS) applicable?	☐ Yes	☐ No		
Detail on why or why not.				

Waste Stream Identification No.: _____
Base Process Identification No.: _____
Hazardous Waste Codes: _____

Waste Stream Documentation Form

Specify treatment standards required by LDR or UTS, if applicable.

Treatment group: ☐ Wastewater ☐ Non-wastewater

Regulated Hazardous Constituent (Waste Code)	Concentration	Treatment Standard	LDR/UTS

Other programs potentially impacted by the waste:

Signature of Environmental Field Coordinator	Date

INSTRUCTIONS
CONTRACTOR MONTHLY HAZARDOUS MATERIAL INVENTORY AND USAGE LOG

SUBMITTAL REQUIREMENTS:

Complete Rows A through F (and G and H as appropriate) for each submission. Block E is to be numbered consecutively (1,2,3,…) for each succeeding submission with the last submission being marked with both the appropriate number and "FINAL SUBMISSION."

Columns 1 through 6 must be completed, at least for the first phase of the project, and submitted to the NAS Meridian Contracting Officer prior to the start of the project. All columns, including columns 7 and 8 must be completed upon start of work and submitted on a monthly basis during the project duration to the Contracting Officer. Each monthly report is due with each invoice, but not later than the tenth of the month. The Contracting Officer may withhold up to ten percent retainage from each payment for Contractor's failure to submit a timely and/or accurate "Logs." Final payment will be withheld pending receipt of all required documentation.

DEFINITIONS:

Item 1 – Check for first-time submissions. Attach MSDS.

Item 2 – Common product name: Common name or product end use category associated with the hazardous material. Examples include grease (GP; 85wt), lubricant, adhesive (super glue; epoxy), caulk (latex, rubber), aerosol paint, latex paint, enamel paint, polyurethane paint, epoxy paint, corrosion preventive compound, cleaning compound, abrasive, refrigerant, cement, concrete, asphalt, etc.

Item 3 – Manufacturer product name: Enter the name of the product and unique part number or other identifier provided by the manufacturer on the MSDS (Ex. Parabond C-60 PVC Primer; Grayling #19105 Mastic Remover; Sherwin-Wms #B20W451 Int. latex).

Item 4 – Unit of issue: The amount or size of product contained in a single container or package. The unit of issue quantities is typically given as a volume, weight, or length. Examples of unit of issue include: 5 gallon (GL), 1 pint (PT), 1 quart (QT), 50 pounds (LB), 16 ounces (OZ), 8 fluid ounces (FL), 100 grams (GM), 225 cubic feet (CF), and 50 feet (FT).

Item 5 – Container type: The type of package or vessel in which the manufacturer supplies the product. Example container types include: Bag (BG), Bottle (BT), Box (BX), Can (CN), Carboy (CB), Cartridge (CT), Cylinder (CY), Drum (DR), Roll (RO), Tank (TK), and Tube (TU).

Item 6 – Total estimated usage quantity: Provide reasonable estimate of the total quantity of each hazardous material to be used during the duration, or for some specific phase, of the project (e.g., 200 gallons, 50 quarts, 50 drums, 25 cylinders, 50 tubes, and 100 cubic yards).

Item 7 – Current inventory quantity stored on-site: For each hazardous material, provide reasonable estimate of the total inventory quantity of that material maintained on-hand for given month.

Item 8 – Actual monthly usage quantity: For each hazardous material listed, provide the actual total quantity of material consumed during the month. If specific hazardous material was not utilized during given month, report 0 for usage.

Item 9 – HW: Check if this material, or the process in which it will be used, has the potential to produce hazardous waste. Disposal of all hazardous wastes must be coordinated through the Environmental Division.

Item 10 – Final disposition of unused materials or wastes: Specify what happened to excess unused material or wastes that are generated from the use of each hazardous material. Short descriptions such as "Restock" or "Landfill" or "Waste Facility" are acceptable. The contractor must also provide a monthly report for non-RCRA solids waste disposal.

Form Number 1234

CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG
(EPRCA 312 & 313 Worksheet)

COMPANY NAME: _____ CONTRACT NO: _____

PROJECT TITLE: _____

Material Name	Manufacturer	State (i.e. Liquid, Solid, Gas)	Storage Quantity Average	Storage Quantity Max.	Quantity (lbs/gals) used in Calendar Year [ ].

Contractor(s) certifies that the hazardous material(s) removed from the installation will be used/reused for its intended purpose.

_____	_____	_____	_____
Signature/Date	Company (Prime)	Signature/Date	Company (Sub)
_____	_____	_____	_____
Signature/Date	Company (Sub)	Signature/Date	Company (Sub)

Submitted By: _____ Phone: _____ Fax: _____ Date: _____

Contractor Administrator: _____ Phone: _____ Fax: _____

CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG
(EPRCA 312 & 313 Worksheet)
Continuation Sheet

COMPANY NAME: _____ CONTRACT NO: _____

PROJECT TITLE: _____

Material Name	Manufacturer	State (i.e. Liquid, Solid, Gas)	Storage Quantity Average	Max.	Quantity (lbs/gals) used in Calendar Year [ ].

Page ____ of ____

SECTION 01670

RECYCLED / RECOVERED MATERIALS

12/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTIION

Not used.

-- End of Section --

SECTION 01782N

FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION
11/05

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

This section provides the requirements for operation and maintenance support information (OMSI). OMSI contains detailed as-built information describing the efficient, economical and safe operation and maintenance, and repair of the facility. OMSI is provided as hard copy, manuals, .pdf files, and computerized maintenance management system (CMMS) data. The OMSI is to be factual, concise, comprehensive and written to be easily used by maintenance personnel. Descriptive matter and theory must include technical details that are essential for a comprehensive understanding of the operation, maintenance and repair of the system. The OMSI preparer shall ensure that OMSI reflect changes to systems and equipment, made during construction. The words "system", "systems", and "equipment", when used in this document refer to as-built systems and equipment.

1.1.1 Organization of OMSI

Prepare the OMSI in three parts. PART I - Facility Information, PART II - Primary Systems Information, and PART III - Product Data. Cross-referencing within or between OMSI Parts must be specific.

1.1.2 Sources of Data

The sources of data needed to prepare the OMSI include but are not limited to, the design plans and specifications, field visits, approved construction submittals and manufacturer's catalog data for materials, methods, and systems used in this contract.

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01331N DESIGN SUBMITTAL PROCEDURES and Section 01332N CONSTRUCTION SUBMITTAL PROCEDURES.

SD-06 Test Reports

Validation Site Visit and Presentation; G

SD-11 Closeout Submittals

OMSI, Preliminary Submittal; G

OMSI, 100% - Prefinal Submittal; G

OMSI, Final Submittal; G

1.3 SUBMITTAL FORMAT

1.3.1 Hard Copies

Bind the OMSI in durable, hard cover, three-ring, water and grease resistant binders, which hold 8.5" X 11" sheets. Binders shall have clear pockets located on the front and on the spine that hold printed sheets. Parts I, II, and III are separate binders with white, blue, and red spine inserts (respectively). Use high quality paper and dividers of heavy-duty paper with plastic reinforced holes and integrated tabs. Tabs must be of varying size and color to distinguish organization. Use plain tabs to show the UNIFORMAT II number and title in Part III, Product Data. Provide a Master Table of Contents for each OMSI binder. Identify each binder on both the cover insert sheet and the spine insert sheet with the following information:

1. OMSI Part I, II or III with appropriate titles
2. Building Number
3. Project Title
4. Activity and Location
5. Construction Contract Number
6. Prepared For: (Contracting Agency)
7. Prepared By
8. Volume Number - Each binder is a single volume. Number each volume consecutively.

1.3.2 Electronic Format (PDF)

Provide the OMSI on Compact Disk using Adobe Acrobat 5.0 or similar software capable of producing PDF (Portable Document Format) files. The PDF file is duplicate of the hard copy format. The PDF files shall be indexed by part (Facility Information, Primary Systems Information, and Product Data) and each entry identified in the table of contents.

1.3.3 Computerized Maintenance Management System (CMMS) Data

Provide data in format that can be imported into Single Platform Maximo CMMS.

1.4 SUBMITTAL REQUIREMENTS

1.4.1 Preliminary Submittal

Submit the Preliminary submittal when construction is 50% complete. Provide two hard copies to the Contracting Officer. Present the submittal in sufficient detail to evaluate the data collection and arrangement process. One of these copies, reviewed by the Contracting Officer, with review comments, will be returned to the Contractor for preparation of the 100% submittal. Include in the submittal, as a minimum, all available Part I, Facility Information; all systems of Part II, Primary Systems Information (at least one system shall be essentially complete and the remaining systems shall be at least 50% complete); and at least two divisions of Part III, Product Data.

1.4.2 100% - Prefinal Submittal

Provide two hard copies to the Contracting Officer. The 100% - Prefinal submittal is due 30 days prior to Beneficial Occupancy Date (BOD). This submittal shall be a complete, working document that can be used to operate and maintain the facility.

1.4.3 Final Submittal

Provide two hard copies and two sets of electronically formatted information to the Contracting Officer. The final submittal is due 90 days after BOD.

PART 2 PRODUCTS

2.1 DESCRIPTION OF WORK

2.1.1 OMSI Part I - Facility Information

a. General Facility and System Description - Describe the function of the facility. Detail the overall dimensions of the facility, number of floors, foundation type, expected number of occupants, and facility Category Code. List and generally describe all the facility systems listed in Part II, Primary Systems Information and any special building features (for example, HVAC Controls, Sprinkler Systems, cranes, elevators, and generators). Include photographs marked up and labeled to show key operating components and the overall facility appearance. Include a copy of the final "Completion Certification" which certifies completion and compliance of construction by the Contractor. This documentation will be provided by the Construction Quality Control Manager.

b. Basis of Design - Include the Basis of Design that shows the basic design scope of work, assumptions and the original intentions of the design A/E. Include a copy of the final "Design Quality Control Report Certification" which verifies conformance of the project design to the Request for Proposal. This documentation shall be provided by The Design Quality Control Manager, or the EIC.

c. Safety Hazards - List all residual hazards identified in the Requirements Hazard Analysis as prepared by the design A/E. Provide recommended safeguards for each identified hazard.

d. Floor Plans - Provide uncluttered, legible 11" x 17" floor plans. Include only room numbers, type or function of spaces, and overall facility dimensions on the floor plans. Do not include construction instructions, references, frame numbers, etc.

e. Utility Connection and Cutoff Plans - Provide utility site plans and floor plans that indicate the main interior and exterior connection and cutoff points for all utilities. Include enough information to enable someone unfamiliar with the facility to locate the connection and cutoff points. Indicate the room number, panel number, circuit breaker, valve number, etc., of each connection and cutoff point, and what that connection and cutoff point controls. These plans are in addition to Floor plans.

f. Equipment Warranty Tags and Guarantor's Local Representative - Provide with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment

and appliances are installed. The guarantor's representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide the services prescribed by the terms of the warranty. At the time of installation, tag each item of warranted equipment with a durable, oil- and water-resistant tag approved by the Contracting Officer. Attach tag with copper wire and spray with a clear silicone waterproof coating. Leave the date of acceptance and QC's signature blank until project is accepted for beneficial occupancy. Tag shall show the following information:

EQUIPMENT/PRODUCT WARRANTY TAG

Type of Equipment/Product _____
Warranty Period _____ From _____ To _____
Contract No. _____
Inspector's Signature _____ Date Accepted _____

Contractor:
Name: _____
Address: _____
Telephone: _____

Warranty Contact: _____
Name: _____
Address: _____
Telephone: _____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

g. Extended Warranty Information - List and include copies of all warranties for products, equipment, components, and subcomponents whose duration exceeds one year. Cross-reference the list to the warranty copies included in Part III, Product Data. For each warranty listed indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference all specific operation and maintenance procedures that must be performed to keep the warranty valid.

h. Equipment and Warranty Tags Listing - Provide a table that lists the major equipment shown on the design equipment schedules and written warranties for equipment/products provided. Show the item descriptions, warranty information, locations, model numbers; and the names, addresses, and telephone numbers of the manufacturers, suppliers, contractor and subcontractors.

i. HVAC Filters - Provide a table that lists the quantity, type, size, and location of each HVAC filter.

j. Floor Coverings, Wall Surfaces, Ceiling Surfaces - Provide a table that lists by room number (including hallways and common spaces), the type, and area of finish. The table will include a facility summary of the total area for each type of space and floor, wall, or ceiling finish.

k. Windows - Provide a table that lists by room number (including hallways and common spaces), the type of window, window size, number of each size

and type, and special features. The table will include a facility summary of the total number for each type and size of window.

l. Light Fixtures - Provide a table that lists by room number (including hallways and common spaces), type of light fixture, number of light fixtures, type of bulbs or tubes, and number of bulbs or tubes. The table will include a facility summary of the total number of fixtures of each type and number of bulbs or tubes of each type.

m. Plumbing Fixtures - Provide a table that lists by room number, the number and type of plumbing and bathroom plumbing fixtures (for example, sinks, toilets, urinals, showers and drinking fountains).

n. Roofing - Provide the total area of each type of roof surface and system. Provide the name of the roofing product and system; manufacturer's, supplier's, and installer's names, addresses, and phone numbers. For each type of roof, provide a recommended inspection, maintenance and repair schedule that details checkpoints, frequencies, and prohibited practices. List roof structural load limits.

2.1.2 Part II - Primary Systems Information

OMSI Part II, Primary Systems Information requires using a systems approach. This approach requires that consideration be given to the entire system (that is, the interfaces of equipment, connections and material flow within the system). Use Notes, Cautions and Warnings throughout the Part II, Primary Systems Information to emphasize important and critical instructions and procedures.

OMSI Part II, Primary Systems Information are required for the primary systems listed below that are applicable and provided for the project;

1. Plumbing systems, including temperature actuated thermostatic water mixing valve
2. HVAC systems, including chillers, boilers, heat pumps, air handling equipment, hot and chilled water pumping system
3. Direct Digital Controls/Space Temperature Controls
4. Fire protection systems, including fire alarm systems and sprinkler systems
5. Security systems, including access control, intrusion detection, and closed-circuit television.
6. Sanitary lift stations, including pumps, valves, controls, and monitoring.
7. Site electrical utilities, including transformers.

For each system, address;

a. Operation

(1) System Description - Provide a detailed discussion of the system composition and operation. Include technical details that are essential for an understanding of the system.

(2) Start-Up and Shutdown Procedures - Provide step by step instructions to bring systems from static to operational configurations and from operating to shutdown status.

(3) Normal and Emergency Operating Instructions - Provide a discussion of the normal and emergency operation and control of the system. Address operating norms (for example, temperatures, pressures, and flow rates) expected at each zone or phase of the system. Supplement the discussion with control and wiring diagrams and data. Include shutdown instruction for fires, explosions, spill, or other contingencies.

(4) System Flow Diagrams - Provide a flow diagram indicating system liquid, air or gas flow during normal operations. Integrate all system components into the diagram. A compilation of non-integrated, flow diagrams for the individual system components are not acceptable.

(5) Diagrammatic Plans - Provide floor plans indicating the location of equipment and configuration of the system installation. Include the configuration of associated piping or wiring. Subordinate structural features to utility features.

(6) Field Test Reports - Provide Field Test Reports (SD-06) that apply to equipment associated with the system.

(7) Operator Servicing Requirements - Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

(8) Valve List - Provide a list of all valves associated with the system. Show valve type, identification number, function, location and normal operating position.

b. Preventive Maintenance - Preventive Maintenance Procedures, and Schedules - Provide Task Card for each individual maintenance task identified on the PM plan and Schedule. Include detailed PM procedures, safety instructions and precautions including lock out/tag out precautions, required skill level, number of personnel needed, frequency, special tools needed, parts needed, and estimated time required to complete the task. Include lubrication schedules indicating types, grades and capacities.

c. Troubleshooting Guides and Diagnostic Techniques - Provide step by step procedures for isolating the cause of system malfunctions. The procedures shall clearly state indications or symptoms of trouble; the sequential instructions, including checks and tests to be performed and conditions to be sought, to determine the cause; and remedial measures to bring the equipment and system to operating condition. Identify special test equipment required to perform the procedures. Start the troubleshooting guide at the system level and proceed to a level where detailed manufacturer's troubleshooting procedures for equipment and components can be referenced. Provide clear references to repair procedures included in Part III, Product Data.

2.1.3 PART III - Product Data

Provide a record of O&M data, materials, and equipment information used in the facility construction. Include; the O&M data referenced in the Operation & Repair sections of Part II, drawings, illustrations, and technical information furnished by manufacturers for equipment and system components.

PART 3 EXECUTION

3.1 VALIDATION AND PRESENTATION

Provide a validation presentation of the OMSI Prefinal submittal to the users and field verify the OMSI's completeness and accuracy. Perform the validation site visit at the 100% - Prefinal OMSI submittal stage. Contact the Contracting Officer for the exact date.

The Designer Quality Control (DQC) manager shall attend and provide a certifying statement that validation site visit and presentation is complete.

-- End of Section --

PART 3

PROJECT PROGRAM

Project Program

Riverine and Combatant Craft Operations Facility
P-210
FY08

Stennis Space Center, MS

June 6, 2008

Prepared By:

URS GROUP, INC.

Project Manager: Fred Walker
Architectural: Susan Nute
Civil: Charlie Evans
Structural: Saeed Hassani
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1. PROJECT DESCRIPTION

The purpose of this project is to provide proper permanent riverine operations, boat/equipment storage space, boat launch areas, and docking areas to upgrade the training capability and mission readiness of SBT-22. In addition, isolation and physical readiness training areas will further support Special Warfare Combatant-Craft Crewman (SWCC) Riverine Task Units and SEAL Platoons for interoperability training. Combatant Craft as well as team and individual SWCC and SEAL personal operational equipment areas, office and planning areas, briefing rooms, and personal support areas for training requirements for SWCC and SEAL platoons are included.

The project consists of constructing various new buildings and facilities. A two-story Operations Building will house an armory, personal lockers (cages), briefing rooms, offices, and planning areas. The Operations Building will be no less than 14,900-square feet. It will connect to a one-story Boat Maintenance Building that provides space for boat maintenance as well as an area for loading and unloading one team of four boats. The Boat Maintenance Building will be no less than 7,293-square feet. A separate one-story Boat Storage Building will be located nearby and will provide storage for 12 boats in not less than 9,207-square feet.

All facilities associated with construction of the Operations Building, Boat Maintenance Building and Boat Storage Building are part of the Base Bid, with the exception of the following:

- 120V receptacles and light fixtures at each cage location in the operations Building (Optional Bid Item)
- Catwalks, stairs and removeable railings between boats in the Boat Storage Building (Optional Bid Item).
- *Note that site-related Optional Bid Items are listed in Paragraph 3.2*.

The Operations Building is classified as a “Primary Gathering Building” according to Antiterrorism (AT) criteria. The Boat Maintenance Building and Boat Storage Building are classified as “Uninhabited.”

In addition to the building complex, this project includes widening of an existing boat launching/retrieval ramp, construction of a sheet pile (quay) wall, construction of a helipad, and installation of a vehicle wash rack and parking for 90 personal vehicles (POV).

The project is located on a site southwest of the existing Special Operations Forces (SOF) facilities (Buildings 2600 – 2609) at the Stennis Space Center (SSC). The boundaries for the site are identified in the site surveys included in Part 6, Performance Drawings. The site is immediately adjacent to a portion of an existing Stennis Space Center grounds maintenance complex.

Site development will include tree removal, clearing, grubbing, and all earthwork, pavements, and landscaping, utility connections and distributions, and stormwater collection/distribution necessary to support the facility.

Relationship diagrams for the new facility are included in Part 6, Performance Drawings. These diagrams show the various areas, adjacencies, and access ways for the facility.

1.1 WASH RACK FACILITY

The work elements for this project are intended to be designed and constructed consistent with the procedures for a design-build project with the exception of the Wash Rack Facility. This Facility is included in this project; however, full design documents have been prepared by the Government. These documents (drawings, specification, and topographic survey) are included as attachments in Part 6 of this RFP. It is the intent for the Contractor to build the Wash Rack Facility in accordance with those documents.

The Project Program, Performance Technical Specifications, and Prescriptive Specifications included in this RFP have been prepared to address the various elements of this project with the exception of the Wash Rack Facility. The contents of these parts of the RFP should not be interpreted as revising or relaxing any of the requirements of the drawings and specifications for the Wash Rack Facility.

2. PROJECT OBJECTIVES

2.1 MISSION STATEMENT

The mission of SBT-22 is to:

- Prepare Riverine Task Units to conduct special operations in a riverine environment anywhere in the world,
- Be prepared to support Naval Special Warfare employment in their War Plans and contingencies and the National Mission Units in their operations,
- Develop operational employment concepts for riverine Special Operations, and
- Train Special Operations Forces on how to employ those concepts.

The intent of this project is to provide adequate indoor and outdoor facilities for SWCC and SEAL platoons while they are stationed at Stennis Space Center for training and to provide adequate storage for boats and other vehicles associated with the training.

2.2 FACILITY FUNCTION

This project creates efficient, appropriately-sized operations and training space for SWCC and SEAL platoons in training.

The buildings and site facilities shall be designed in accordance with applicable UFC's as listed in Part 4, Performance Technical Specifications.

In addition to the briefing rooms and offices, the Operations Building will house an armory, areas for heads and showers, and caged storage for use by the platoons stationed here for training. The Operations Building will have controlled access with 24 hour security tied into the existing SBT-22 security system.

Supporting site facilities include access and circulation pavements, parking areas, driveways, sidewalks, and fencing.

2.3 PROJECT SPECIFIC PRIORITIES

The following considerations are of primary importance for the design and construction of this project. Narratives and/or graphic illustrations that demonstrate an understanding of, and compliance with these priorities, are minimum requirements to receive an "Acceptable" rating of the Contractor's proposal.

2.3.1 SUSTAINABLE DESIGN

In accordance with Executive Order 13123 and other pertinent directives, integrate sustainable principles into the design, development and construction of the project. Reduce the total cost of ownership of the facility using a whole building, life-cycle approach.

Provide integrated sustainable design strategies and features to minimize the energy consumption of the facilities; conserve resources; minimize adverse effects to the environment; and improve occupant productivity, health, and comfort. In accordance with NAVFAC Instruction 9830.1 the facility and all site features shall be designed and constructed to meet a minimum of "Certified" in the US Green Building Councils (USGBC) "Leadership in Energy and Environmental Design (LEED) Rating System version 2.2."

The constructed facility shall be Sustainable Validated by NAVFAC as having met as many prerequisites and as many credits practical in the LEED-NC (New Construction) rating system. The goal for Sustainable Validation is meeting all prerequisites and achieving at least 26 credits.

2.3.2 ENERGY CONSERVATION

All new facilities and major renovation projects shall conform to the latest edition of ASHRAE/IESNA Standard 90.1-2004 "Energy Standard for Buildings Except Low-Rise Residential Buildings," January 2004. In addition, for new buildings, the Energy Policy Act of 2005 requires federal building designs achieve energy consumption levels 30% below the ASHRAE 90.1 baseline building. The Designer of Record (DOR) shall perform and submit

an energy analysis in accordance with Appendix G of ASHRAE Standard 90.1 showing the calculated baseline building performance and the proposed building performance on an energy consumption basis to document compliance with the Act. For the ASHRAE analysis, energy for receptacle and process loads should not be included the calculations for compliance. If the 30% reduction level is not life-cycle cost-effective based on the analysis, the Designer of Record (DOR) shall use an iterative procedure to find the lowest level of energy consumption that is life-cycle cost-effective. To determine if a feature is "life-cycle cost-effective," a life cycle cost analysis shall be performed in accordance with 10 CFR 436 Subpart A. Any of four methods are acceptable to determine LCC: (Lower LCC, Positive net savings, Investment Ratio (SIR) greater than 1, or an adjusted rate of return greater than discount rate).

2.3.3 SITE AND EXTERIOR DESIGN

The site layout in the vicinity of the Operations Building, Maintenance and Storage Complex shall provide for appropriate access by pedestrians, private vehicles, Government vehicles and service vehicles. Access to the immediate vicinity of the Operations Building shall be controlled, and limited to authorized individuals and vehicles only.

No specific access is required to the sheet pile wall, but the helipad area involved construction of a section of road linking the helipad with the adjacent fence and a gate in the fence.

Parking is required for POV and Government vehicles as indicated.

The exterior appearance and materials selection should reflect the same character as the existing SOF facilities (Buildings 2600 – 2609). Materials and details of construction should result in low maintenance exteriors suitable for the aggressive high humidity, high intensity storm, and waterfront environment present at Stennis Space Center.

In order to illustrate compliance with these requirements, submit exterior elevations at an appropriately large scale, with the Contractor's Proposal.

2.3.4 INTERIOR DESIGN/FUNCTIONAL LAYOUT

Based on an evaluation of the Users' space requirements and relationships/ adjacencies, the Functional Relationship Diagrams included in the Part 6 Performance Drawings were developed. These Relationship Diagrams show the various areas, adjacencies, and access ways for the Facility.

These diagrams should be used in conjunction with the Space Tabulation in Section 4 of this program to develop the actual floor plans. In developing the floor plans required/desirable area sizes and relationships/adjacencies shall be retained. The final floor plans shall require Base and User (NSW Group 4 and NSW SBT-22) concurrence.

In order to illustrate compliance with the stated requirements, provide complete, dimensioned floor plans. These plans shall be no less than 1/8"=1'-0" scale. Enlarged floor plans of the heads shall be no less than 1/4"=1'-0" scale.

The floor plans submitted with the Contractor's proposal should demonstrate an understanding of the types of areas and relationships of the various spaces in the buildings. They should also show the locations of special wall construction at boundaries of the various types of spaces and the wall types for each space. A narrative should also be provided, which explains the Contractor's understanding of the various types of spaces within the buildings along with explaining how the design will address these spaces.

2.3.5 INTERIOR FINISHES

Interior finishes shall be simple, durable, project a positive professional image, and be supportive of the function as a combatant craft operations facility. Low maintenance is of primary importance. A Finish Schedule is included in Part 6.

FLOORS

Generally, flooring on the first floor and in non office/briefing spaces on the second floor of the Operations Building will be quartz vinyl tile. Offices, briefing rooms, and similar spaces will be carpet tile. Floors in heads and showers will be porcelain tile. Floors in the cage area and the armory will to be sealed concrete, as will those in the Boat Maintenance and Storage Buildings.

WALLS

All walls in the Operations Building will be gypsum board on metal studs or over furring over CMU except for walls in the cage area, the armory, and mechanical spaces. Walls in these spaces can be painted CMU. Walls in heads and showers will be porcelain tile.

Interior surfaces of walls in the Boat Maintenance Building can be painted CMU.

Interior surfaces of walls in the Boat Storage Building will be painted CMU and prefinished metal panels.

CEILINGS

Ceilings in the Operations Building will generally be suspended acoustical tile. Ceilings in heads and showers will be moisture-resistant gypsum board. Ceilings in the cage area and the armory will be the painted structure above.

All structural elements, including the ceilings/roof structure, in the Boat Maintenance and Storage Buildings will be painted with a multi-coat epoxy coating system that is suitable for severe marine environments.

The materials used and the color scheme for this project will match the existing SOF facilities (Buildings 2600 – 2609).

2.4 APPROPRIATE DESIGN

The Government is interested in a best value proposal that supports the functional needs of the User and Activity. The levels of quality and durability specified shall be responsive to the function, mission effectiveness, and economics of a high use and visible military support structure expected to perform for 30 years or longer. The design solution shall underscore the essential elements whilst invoking the spirit of the Users and their mission.

2.5 WORKFLOW PROCESS

The separated entry drive and POV parking area, indicated on the Part 6 Performance Drawings, will allow for controlled access for delivery of equipment/supplies and personnel to the facility without interfering with permanent personnel accessing POV parking.

The Operations Building, as presented in the Functional Relationship Diagrams in the Part 6 Performance Drawings, is organized to provide for the appropriate flow of people and equipment/supplies within the facility.

Personnel will primarily enter the complex through a turnstile in the perimeter fence adjacent to the POV parking, and will proceed to the Operations Building entrance. Access to the Boat Maintenance Building is through the Operations Building. Access to the Boat Storage Building is through the equipment yard.

The site and floor plans submitted with the Contractor's proposal should demonstrate an understanding of this work flow requirement and present a clear and precise solution for the movement of personnel and equipment/supplies into and within the facility.

2.5.1 HOURS OF OPERATION

As a training facility, the complex will be used 24/7 (24 hours per day, seven days a week).

2.5.2 STAFFING/OCCUPANCY

Type of Activity	No. of Persons	Description of Activity
Armory	0	Storage of weapons
CSS	2	Administration for Armory
Riverine Task Units	70	Personnel in Training
Training Personnel	20	Trainers (Squadron Interoperability Task Units)
Visitors	3	Visitors
Maximum Occupancy	**95**	

2.6 SPECIAL DESIGN CHALLENGES

These are site and project specific "difficult" issues. In order to receive an "Acceptable" rating, each Contractor proposal must clearly address these issues and clearly illustrate a design solution.

2.6.1 ANTITERRORISM (AT)

This Operations Building is a "Primary Gathering Building" and must be designed as such in accordance with the latest edition of UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings. The building layout on the site must be carefully coordinated to respect numerous site constraints from existing facilities and limited work areas.

2.6.2 SECURE FACILITY

The new building complex is to be designed and constructed with a security access system that will be incorporated into the existing SBT-22 security system. Care shall be taken to ensure the RFP requirements are satisfied while still providing a system compatible with the existing at SBT-22.

2.6.3 SOIL AND SITE CONDITIONS

The Contractor shall become familiar with the existing site and subsurface conditions including the topographic and geotechnical information included in Part 6. Site specific considerations include the substantial topographic relief across the existing site, the need to maintain drainage patterns from off-site sources, subsurface soil conditions which will impact design, and the presence of wetlands within and adjacent to the site. Descriptions of anticipated site improvement methods and foundations, along with their affects on the cost of the construction, quality of construction, and construction timeline, should be included in the Contractor's Proposal Narrative to illustrate an understanding of these conditions.

2.6.4 BUILDING AREA LIMITATIONS

Based on the approved Form 1391 for this new training facility, the maximum allowable gross building area for the Operations Building is 15,998 square feet. Similarly, the maximum allowable gross building area for the Combatant Craft Buildings (Boat Maintenance Building and Boat Storage Building) is 24,799 square feet. In order to illustrate compliance with the stated requirements, provide complete dimensioned floor plans along with a space tabulation table in a format similar to the space tabulation table included herein as part of the Contractor's Proposal.

2.6.5 ENVIRONMENTAL ISSUES

A wetland delineation has been completed by the National Aeronautics and Space Administration (NASA) for this project. The construction of this project will impact wetlands and mitigation will be required. The acreage impacted is estimated at 4.74 acres. The Contractor shall be required to mitigate these impacts by purchasing wetland credits from NASA at an estimated $7,000 per acre. Total estimated cost is $33,180. This fee shall be included in the Contractor's proposal and will have to be received by NASA prior to them releasing the wetland permit for construction activities. NASA will obtain the permit from the U.S. Army Corps of Engineers.

Copies of the project's Record of Environmental Consideration prepared by NASA as well as the NASA Site Approval are included as attachments in Part 6 of this RFP. There are additional environmental requirements addressed elsewhere in this RFP.

2.7 ADAPTABILITY AND FLEXIBILITY

Although the program does not call for functional flexibility, it would be desirable to organize structural and other building elements in such a way to provide for economical future internal modification of the areas. The Contractor's proposal shall include a narrative addressing how the design can provide flexibility in allowing for future modification.

2.8 COMPATIBILITY WITH ADJACENT BUILDINGS

The exterior appearance and materials selection for the new Riverine and Combatant Craft Operations Facility should reflect the same character as the existing SOF facilities (Buildings 2600 – 2609). Because of this it is important that a similar architectural appearance and use of similar materials be included in the design solution proposed by the Contractor.

3. SITE ANALYSIS

3.1 EXISTING SITE CONDITIONS

The site for the new Riverine and Combatant Craft Operations Facility is on property that is part of the Stennis Space Center (SSC) which is operated by the National Aeronautics and Space Administration (NASA). SSC was initially developed approximately 40 years ago with the major infrastructure (roads, drainage systems and utilities) constructed at that time with additional improvements completed as required to support the construction activities of the more than 40 federal, state, academic, and private companies that have a presence at SSC.

Stennis Space Center is located in South Mississippi on I-10 at Exit 2 approximately 48 miles west of Biloxi and 45 miles east of New Orleans. Access to SSC for this project can be through either the South Gate or the North Gate via County Road 607/Trent Lott Parkway. The locations of the various work areas in this project are indicated on the Performance Drawings included in Part 6 of this RFP. Access to the site is off Endeavor Boulevard that extends south from the existing SOF complex.

This project is spread over several sites, the largest of which is where the new Operations Building, Maintenance and Storage Complex is located. This area is sometimes referred to as the Main Complex elsewhere in this RFP. The eastern part of this area has some existing facilities including several buildings, circulatory pavement, and utilities. The western and northern portion is undeveloped and heavily vegetated. There is substantial topographic relief across the site with elevations ranging from about 5 to 20 feet. There are drainage channels that run through the site from northeast and northwest to south and discharge into the East Pearl Canal south of the site.

East of the Main Complex is an existing concrete boat ramp used by SOF for launching their craft into the East Pearl Canal. This ramp is to be widened under this project. The ramp is approximately 140 feet long, extending from about elevation 14 at the top to elevation -5 feet at the base.

To the east of Endeavor Boulevard are the sites for the Wash Rack, the Sheet Pile Wall, and the Helipad. The Wash Rack site conditions show on the design drawings attached to Part 6. The Sheet Pile Wall site is adjacent to East Pearl Canal and an existing waterfront docking complex. The site is along the sloping earth bank for the canal where grades range from approximately elevation 4 to -5 feet.

The Helipad site is east of the other project work areas with grades ranging from about elevation 16 to 25 feet. There are some existing trees and brush on the site and there are several existing utilities and a fence bordering the site.

There is extensive vegetation in the area of the new Operations Building, Maintenance and Storage Complex, and the new Helipad. The sheet pile wall and boat ramp widening areas have limited existing vegetation. The Contractor is expected to clear all existing vegetation prior to beginning development of the site, with adjacent vegetation not requiring removal being protected.

Recent topographic surveys of the sites are included as an attachment to Part 6. SSC has indicated there are no historical or archeological issues within the proposed sites. SSC has also indicated there are existing wetlands within the area planned for the construction of the Main Complex. SSC is obtaining a permit from the U.S. Army Corps of Engineers for disturbance of these wetlands. There are additional wetlands adjacent to the project that shall be protected during the construction.

The general locations of the new facilities are illustrated on the Part 6 Performance Drawings.

A Geotechnical Report has been prepared for this project, and is included in Part 6.

3.2 SITE DEVELOPMENT REQUIREMENTS

The major site development elements in this project include the following:

- Operations Building, Maintenance and Storage Complex to include 45 POV parking spaces (Base Bid Item)
- Boat Ramp Widening (Optional Bid Item)

- Wash Rack Facility (Optional Bid Item)
- Sheet Pile Quay Wall (Optional Bid Item)
- Helipad Facility (Optional Bid Item)
- Additional 45 POV Parking Spaces at the Operations Building (Optional Bid Item)
- *Note that building-related Optional Bid Items are listed in Paragraph 1. (Project Description).*

The Wash Rack Facility has previously been designed, the documents for which are included in Part 6. This Facility is discussed under the Project Description in this Program.

The Operations Building, Maintenance and Storage Complex, also called Main Complex in this RFP, includes a two-story Operations Building with an attached one-story Boat Maintenance Building. The Boat Maintenance Building will have drive-through bays for truck and boat/trailer units. Also in the complex is a Boat Storage Building with bays for 12 boat/trailer units. All of these facilities, along with circulation and access drives and Government vehicle parking areas are within a perimeter security fence. Access to this part of the Complex will be off of Endeavor Boulevard. The paved drives and maneuvering areas shall be sized to adequately allow for the various Government vehicles and trailered boats to easily get access to the complex and enter the maintenance, storage, and parking areas. Due to significant topographic relief at the site, it will be necessary to fill much of the area to raise grades to suitable levels for buildings and pavements. Subsurface investigations indicate some undercutting or other subsurface improvements will be necessary to limit settlements beneath new building and pavement areas.

Outside the proposed fence is a paved POV parking lot for staff and visitors. Access to this parking area will be from a side road connecting to Lower Gainesville Road.

East of the Main Complex is an existing boat ramp that is to be widened a minimum of 14 feet. This will allow SOF personnel to launch/retrieve two boats simultaneously.

East of Endeavor Drive at the end of an unnamed road is a waterfront complex on the East Pearl Canal. A portion of the existing bank has sustained erosion over time. This project involves providing a sheet pile wall (Quay Wall) in the approximate location indicated in the Part 6 Performance Drawings. This wall shall consist of steel sheet piles with concrete encapsulation. The top of the wall should be at approximately elevation 4 and the area behind should be filled to provide a level landside area. The SOF personnel will use this wall for temporary mooring of their boats. Provide return wall sections at the ends and slope protection to prevent future erosion.

At a separate site further east of Endeavor Boulevard provide a Helipad Facility for use by SOF. The Helipad should meet the requirements of UFC 3-260-01, “Airfield and Heliport Planning and Design” for a standard VFR helipad for Navy. The work will include a concrete pad, unpaved shoulders, tie downs, a wind sock, lights, and static discharge hook-up. Additionally, a concrete access drive and modifications to an adjacent existing fence shall be provided. The adjacent area’s vegetation shall be removed or trimmed sufficiently to meet clear zone criteria for the helipad.

The Operations Building is classified as a “Primary Gathering Building.” All site development shall comply with AT requirements outlined in the current edition of UFC 4-010-01. All pavement within minimum required antiterrorism standoff distances will require markings and signage to properly identify the service areas of the site being for Government vehicles only.

The new buildings, access drives, and loading/unloading areas shall be generally sited as indicated on the Part 6 Performance Drawings. Concrete sidewalks shall be provided for access to all building entrances and as necessary for a complete and accessible exterior circulation system to serve the Facility.

Parking areas for Government vehicles and maintenance/circulation area pavements within the complex shall be concrete pavement. The access drive and POV parking shall be an asphalt pavement section.

The utilities needed for this project are potable water, fire protection water, sanitary sewer, storm water, natural gas, electrical power, CATV, telephone, and fiber optic communications. SSC has indicated the services have adequate capacity for the proposed facility, but new distributions to the site

will be needed. Potential points of connection for utilities are included in the Part 6 Performance Drawings.

It will be necessary for the project to develop an appropriate surface drainage system for the site. This system must collect and transport all runoff (including buildings and site) through underground pipes, swales or other structures to the existing drainage system around the site. There are also several surface water drainage channels that presently pass through the site. These shall be rerouted or placed underground in adequately sized conveyance systems as part of this project. The stormwater design shall be coordinated with the NASA Environmental Engineer.

Provide exterior building, site, and pedestrian lighting for safe use of the facility at night. All exterior lighting shall be coordinated and integrated into the overall design of the site and buildings.

Provide landscaping consistent with the palette of materials found at SSC and/or used in the surrounding areas. Landscape materials shall be sustainable, low maintenance, and supportive of the mission of the facility. Irrigation will not be provided, so landscape materials that can survive without irrigation shall be selected and installed.

The design of site features, such as sidewalks and facility access, shall conform to the Uniform Federal Accessibility Standards (UFAS).

During the execution of the work in this project, the Contractor shall keep all activities within the immediate project limits; this includes all staging, stockpiling, storage of materials and equipment, vehicle parking, and access/circulation routes. The work in this project shall not adversely affect the surrounding environment nor ongoing operations at adjacent facilities.

4. BUILDING REQUIREMENTS

4.1 SPACE TABULATION

The following table provides a breakdown of spaces required within the new buildings, along with their required sizes. This table should be coordinated with the Relationship Diagrams in Part 6 Performance Drawings.

Riverine and Combatant Craft Operations Facility
Stennis Space Center, MS

Space Name	Occupants 5/6/08	Spaces	NSF (each)	Required/ Programmed Interior (SF)	Remarks	Reference
Operations Building						
FIRST FLOOR						
Armory	0	1	1,500	1,500	User Request	
Sub-Total Armory			***1,500***	***1,500***		
Administration						
CSS	2	1	60	120	Use Open Office 60 NSF/person	(P-80 61010-8)
Sub-Total CSS	***2***			***120***		
Other Spaces						
Female Head	0	1	48	48		
Female Shower	0	1	51	51		
Male Head	0	1	270	270	3T, 2U, 5L = +/- 22' x 12' (for up to 100 persons)	UFC 3-420-01, Appendix A
Male Shower	0	1	180	180	10 Showers = +/- 10' x 18'	
Janitor	0	1	35	35		
Main Electrical Room	0	1	120	120		
Mechanical Room	0	1	120	120		
Entrance Facility (TelComm Room)	0	1	120	120		
Stair	0	1	400	400		
Sub-Total Other Spaces	***0***			***1,344***		
Total Without Cages				**2,964**		
Cages						
6' x 5' x 8' High Cages	0	90	42.5	3,825	42.5 SF/cage, Includes Circulation	
Sub-Total Cages				***3,825***		
Total First Floor				***6,789***		

Riverine and Combatant Craft Operations Facility
Stennis Space Center, MS

Space Name	Occupants 5/6/08	Spaces	NSF (each)	Required/ Programmed Interior (SF)	Remarks	Reference
SECOND FLOOR						
Riverine Task Unit Office	11	2	660	1,320	Use Open Office 60 NSF/person	(P-80 61010-8)
Riverine Task Unit Commander Office	4	2	360	720	Use Open Office 90 NSF/person	(P-80 61010-8)
Task Unit Commander Offices for 1						
Mission Briefing Room(s)	90	1	1,050	1,050	(150 SF+ (90 persons x 10 SF/person))	(P-80 61010-9.2)
Squadron Interoperability Task Unit Office	8	1	480	480	Use Open Office 60 NSF/person	(P-80 61010-8)
Squadron Interoperability Task Unit Commander Office	4	1	360	360	Use Open Office 90 NSF/person	(P-80 61010-8)
Training Office						
TOC	4	1		0	Combine with one Briefing Room	
Comm Room	2	1	200	200	User Request	
River OPS Control Watch Station	2	1	300	300	Includes coffee mess and vending	
Sub-Total				***4,430***		
Other Spaces						
Female Head	0	1	36	36		
Male Head	0	1	270	270	3T, 2U, 5L = +/- 22' x 12' (for up to 100 persons)	UFC 3-420-01, Appendix A
Janitor	0	1	35	35		
Electrical Room	0	1	120	120		
Mechanical Room	0	1	120	120		
TelComm Room	0	1	120	120		
Stair	0	1	0	0	Accounted for on 1st floor	
Sub-Total Other Spaces				***701***		
Total Second Floor				***5,131***		
TOTALS				**11,920**		
TOTAL GROSS AREA @ 1.25 NTG				**14,900**		(P-80 61010-11)
AUTHORIZATION				**15,898**		
				1477 SM		
				998	SF Below Authorization	

Space Name	Occupants	Spaces	Facility Request (Each) (SF)	Required/ Programmed Interior Area (SF)	Remarks
Combatant Craft Building (s)					
Boat Maintenance Building					
Boat Spaces	$ -	4	910	3,640	4 @ 14' x 65'
Maintenance Space	$ -	1	2,340	2,340	36' x 65'
Circulation Space at Operations Building Interface		1	650	650	10' x 65'
Sub-Total				***6,630***	
Net to Gross Factor: 1.10 NTG					
GROSS AREA BOAT MAINTENANCE BUILDING				**7,293**	
Boat Storage Building(s)					
Boat Spaces	$ -	12	698	8,370	Space for 3 sets of 4 boats
Circulation Space at end Boat(s)				0	Included above
Sub-Total				***8,370***	
Net to Gross Factor: 1.10 NTG					
GROSS AREA STORAGE BUILDING(S)				**9,207**	
TOTAL GROSS AREA				**16,500**	
AUTHORIZATION				**24,770**	
				2302 SM	
				8,270	SF Below Authorization

4.2 SPACE RELATIONSHIPS

The primary focus for the design of this facility is to develop a solution that effectively responds to the training needs of the SWCC and SEAL platoons within the site and budget constraints associated with the Project. Based on an evaluation of the User's space requirements and the intended relationships/adjacencies between the various spaces and activities, the Relationship Diagrams included in the Part 6 Performance Drawings were developed. The Relationship Diagrams represent one potential solution to the organization of this project. The Contractor should evaluate their proposed solution against all the criteria within this RFP to present a design that best responds to the space relationship issues, as well as the other important issues described herein.

The Relationship Diagrams should be used in conjunction with the Space Tabulation to develop the site plan and floor plans. Where practical and acceptable to the Base and Users, configurations of spaces may be revised. Final configurations and sizes of spaces will need to be coordinated by the Contractor to be compatible with furnishings and equipment going into each space. Individual spaces may not be downsized after project award without obtaining Base and User approval.

Following award, the Contractor is required to review the contents of the RFP, perform interviews of the Users and Base personnel, develop relationship/ adjacency criteria, and validate or revise the Relationship Diagrams as necessary to optimize the usefulness and value of the Facility. Review Part 4, Section E2020 for further instructions.

The Operations Complex is to be a secured facility, so all entry points will require card reader access. Entry into the Operations Building will require card access or electronic admittance by a staff member within the facility.

4.3 EXTERIOR CHARACTER

It is important that the exterior appearance of the buildings in this project should reflect the same architectural character and materials as used in the existing SOF facilities (Buildings 2600 – 2609). The exception to this is that the Boat Storage Building may be a Pre-engineered Metal Building.

Materials and details used in the construction must result in low maintenance exteriors suitable for the aggressive high humidity, high intensity storm, and waterfront environment present at the Stennis Space Center. The new facility, taken as a whole, shall project a professional, military appearance that is clean and uncluttered, while responding to the activities required by the Users.

Architecturally, the designers should incorporate security features into the layout and forms of the buildings. The designers shall also employ principles of sustainable design and energy conservation consistent with Navy policies and objectives.

Exterior lighting increases safety, enhances appearance, and provides a sense or orientation and security. Install appropriate lighting for the functional aspects of the project that are compatible with the installation and architectural design.

5. ROOM REQUIREMENTS

The following tables provide specific requirements for individual spaces within the new Facility. The types, quantities and sizes of items indicated should be considered minimum values. Additional items and/or quantities of items are indicated elsewhere in this RFP and shall be accounted for in the actual design and construction.

Individual room configurations and the layout of contents are to be developed by the Contractor based on his User interviews and determination of required contents. Refer to Part 4, Section E2020 for furnishings requirements.

5. ROOM REQUIREMENTS

ARMORY

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
Function: Storage and distribution of weapons, night vision goggles and accessories for both items **Special Dimensions:** See Space Tabulation. **Acoustics:** Acoustic privacy is not important to this space. **Occupancy:** 0 **Access:** Access is via the corridor. **Other:** • Permanent CMU or concrete partitions, and solid concrete floor and ceiling. • Meet physical construction requirements of OPNAVINST 5530.13C, "Department of the Navy Physical Security Instruction for Conventional Arms, Ammunition, and Explosives Storage (AA&E)," and DoD 5100.76-M, Department of Defense Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives." • Provide dehumidification as required for safe maintenance of weapons and material	C101002	Demountable Partitions	Wire Mesh Partitions	2	Full-height	Provide wire mesh partitions to separate the Armory into 4 spaces – a vestibule and 3 arms storage areas. Each storage area will connect to the vestibule via a locked gate.
	D503003	Telecommunications System	NiPRNet Outlets	4		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications System	SiPRNet Outlets	2		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503007	Television System	CATV Outlet	1		
	E101005	Security and Vault Equipment	Vault Door	2	3'-6" x 6'-8"	Vault Door and Day Gate with CD X09 locks.

COMBAT SERVICE SUPPORT (CSS)

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
Function: Office Space for Armory. **Special Dimensions:** See Space Tabulation. **Acoustics:** Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 40 is adequate. **Occupancy:** 4. **Access:** Access is via the corridor. **Other:** • Permanent drywall or CMU partitions.	C102001	Standard Interior Doors	Wood door	1	3'-0" x 6'-8" minimum	
	D503003	Telecommunications System	NiPRNet Outlets	5		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications System	SiPRNet Outlets	5		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications System	FAX Outlet	1		Provide at least the number indicated. . The final quantity will be based on the results of user interviews.
	D503007	Television System	CATV Outlet	1		

CAGE AREA

Space Characteristics

Function:
Storage of gear and personal items of male students in the Dets.

Special Dimensions:
See Space Tabulation.

Acoustics:
Acoustic privacy is not important to this space.

Occupancy:
0

Access: Access is from the corridor and from the Boat Maintenance Building.

Other:
- Permanent drywall or CMU partitions.
- This space will support 90 cages which will be provided as collateral equipment.
- Provide 4-inch high x minimum 6-foot wide continuous concrete curb beneath rows of cages.
- Slope floor slab to drains between rows of cages.
- Coordinate with the Government Agent for specific design of cages.
- Provide one 120-volt receptacle and overhead lighting for each cage (this is a Bid Option).

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B203002	Solid Doors	Steel Door	1	3'-0" x 6'-8" minimum	Door to Boat Maintenance Building
C102001	Standard Interior Doors	Wood Door	As Required	3'-0" x 6'-8" minimum	Door to corridor and Male Head and Shower
D203003	Floor Drains	Room Floor Drain	As required		Place between rows of cages.

FEMALE HEAD (Per Female Head)

Function:
Toilet facility.

Special Dimensions:

Acoustics:
A minimum Sound Transmission Class (STC) of 40 is adequate to ensure that noises emanating from the space do not bother people in adjacent spaces.

Occupancy: Varies

Access:
Access is via corridor

Other:
- Permanent drywall or CMU partitions.
- First floor Female Head is accessible, second floor Female Head is not.

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	C102001	Standard Interior Doors	Steel Doors	1	3'-0" x 6'-8" Minimum	
	C103002	Toilet & Bath Accessories	Combination Paper Towel Dispenser/Waste Receptacle	1		
	C103002	Toilet & Bath Accessories	Mirror with integral shelf	1		Above lavatory
	C103002	Toilet & Bath Accessories	Toilet Tissue Dispenser	1		
	C103002	Toilet & Bath Accessories	Grab Bar	1 set		
	C103002	Toilet & Bath Accessories	Soap Dispenser	1		
	D201001	Water Closets	Flush Valve Water Closets	1		Accessible on first floor, only.
	D201003	Lavatories	Wall-hung Lavatory	1		Accessible on first floor, only.
	D203003	Floor Drains	Room Floor Drain	1		
	C103002	Toilet & Bath Accessories	Sanitary Napkin Dispenser			1 per Female Head
	C103002	Toilet & Bath Accessories	Sanitary Napkin Disposal Unit			1 per Female Head

FEMALE SHOWER

Space Characteristics

Function:
Shower facility.

Special Dimensions:

Acoustics:
A minimum Sound Transmission Class (STC) of 40 is adequate to ensure that noises emanating from the space do not bother people in adjacent spaces.

Occupancy: Varies

Access:
Access is via corridor

Other:
- Permanent drywall or CMU partitions.
- Locate shower head and controls on wall adjacent to shower curtain. Controls shall be easy to access for anyone wishing to use the shower

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Steel Doors	1	3'-0" x 6'-8" Minimum	
C103002	Toilet & Bath Accessories	Mirror	1		
C103002	Toilet & Bath Accessories	Grab Bar	1		
D203003	Floor Drains	Room Floor Drain	2		1 per room and 1 per shower
C103002	Toilet & Bath Accessories	Shower Seat	1		
C103002	Toilet & Bath Accessories	Shower Rod	1		
C103002	Toilet & Bath Accessories	Shower Curtain	1		
C103002	Toilet & Bath Accessories	Robe Hooks	2		
C103002	Toilet & Bath Accessories	Soap Dish	1		Provide in shower stall at accessible height

MALE HEAD (Per Male Head)

Function:
Toilet facility.

Special Dimensions:
See Space Tabulation.

Acoustics:
A minimum Sound Transmission Class (STC) of 40 is adequate to ensure that noises emanating from the space do not bother people in adjacent spaces.

Occupancy:
See Space Tabulation.

Access: Access is via the Cage Area and corridor on the first floor and the corridor on the second floor.

Other:
- Permanent drywall or CMU partitions.
- Plumbing Fixture requirements were derived from the International Plumbing Code as amended by Appendix A of UFC 3-420-01N, based on an occupancy of 90 persons.
- A door between this space and the Cage Area is not required.

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	C102001	Standard Interior Doors	Steel Doors	1	3'-0" x 6'-8" Minimum	Door required at corridor entrance, only
	C103001	Compartments, Cubicles & Toilet Partitions	Toilet Partitions and Urinal Screens	As Required		1 per toilet/urinal if multiple fixtures
	C103002	Toilet & Bath Accessories	Combination Paper Towel Dispenser/Waste Receptacle			Min 1 per single person Head Min 2 per multi-person Head
	C103002	Toilet & Bath Accessories	Mirror with shelf	5		1 per lavatory
	C103002	Toilet & Bath Accessories	Toilet Tissue Dispenser	3		1 per toilet
	C103002	Toilet & Bath Accessories	Grab Bar	1		At accessible toilet
	C103002	Toilet & Bath Accessories	Soap Dispenser	5		1 per lavatory
	D201001	Water Closets	Flush Valve Water Closets	3		1 Accessible.
	D201003	Lavatories	Wall-hung Lavatory	5		1 Accessible.
	D203003	Floor Drains	Room Floor Drain			1 per room
	D201002	Urinals	Flush Valve Urinal	2		1 Accessible

MALE SHOWER

Space Characteristics

Function:
Shower facility.

Special Dimensions:
See Space Tabulation.

Acoustics:
A minimum Sound Transmission Class (STC) of 40 is adequate to ensure that noises emanating from the space do not bother people in adjacent spaces.

Occupancy:
See Space Tabulation.

Access: Access is via first floor Male Head

Other:
- Permanent drywall or CMU partitions.
- Provide 1 gang-shower to accommodate 10 people at one time.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Wood Doors	1	3'-0" x 6'-8" minimum	
C103002	Toilet & Bath Accessories	Shower Rod	1		At entrance to gang-shower
C103002	Toilet & Bath Accessories	Shower Curtain	1		At entrance to gang-shower
C103002	Toilet & Bath Accessories	Robe Hooks	20		
C103002	Toilet & Bath Accessories	Soap Dish	10		Spaced around gang-shower
D203003	Floor Drains	Room Floor Drain	3		2 for the gang-shower and 1 between the shower and the Male Head

JANITOR

Space Characteristics

Function:
Janitorial supplies and equipment.

Special Dimensions:

Acoustics:
Noise control is not important to this space.

Occupancy: 0

Access:
Access is from the corridor

Other:
- Permanent drywall or CMU partitions.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Steel Door	1	3'-0" x 6'-8 minimum"	
C103002	Toilet & Bath Accessories	Towel Dispenser	1		
C103002	Toilet & Bath Accessories	Waste Receptacle	1		
C103002	Toilet & Bath Accessories	Soap Dispenser	1		
C103002	Toilet & Bath Accessories	Utility Shelf	1		
D201004	Sinks	Mop Sink	1		
D203003	Floor Drains	Room Floor Drain	1		

CORRIDOR(S) (Includes Entrances/Exits/Lobby)

Function:
Circulation.

Special Dimensions:

Acoustics:
Noise control is not important to this space.

Occupancy: 0

Access:
Access is from the interior and to the exterior.

Other:
- Permanent CMU partitions.

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	B203001	Glazed Doors	Glazed Doors	1 Pair	Pair of 3'-0" x 6'-8" minimum	Entrance Door
	B203002	Solid Doors	Solid Doors	As Required	3'-0" x 6'-8" minimum	Provide at each exit (other than at Entrance Door). Provide minimum 6-inch wide x 12-inch high vision panel.
	C103099	Other Interior Specialties	Entrance Mat	1 per Exterior Door	Width of door x 72-inches	

MAIN ELECTRICAL ROOM

Space Characteristics
Function: Electrical equipment room. **Special Dimensions:** **Acoustics:** Acoustic isolation from this space is important. Provide a minimum Sound Transmission Class (STC) of 42 for all paths through walls adjacent to occupied spaces. Airborne STC and Impact Insulation Class (HC) for floor/ceiling assemblies shall be equal to or greater than the STC value for the walls. **Occupancy:** 0 **Access:** Access is from the exterior. **Other:** • Permanent CMU partitions. • Extend to underside of structure above.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B203002	Solid Doors	Heavy-Duty Insulated Steel Doors	1 pair	Pair 3'-0" x 6'-8"	

MECHANICAL ROOM(S)

Space Characteristics

Function:
Indoor mechanical room.

Special Dimensions:

Acoustics:
Acoustic isolation from this space is important. Provide a minimum Sound Transmission Class (STC) of 50 for all paths through walls adjacent to occupied spaces. Airborne STC and Impact Insulation Class (HC) for floor/ceiling assemblies shall be equal to or greater than the STC value for the walls.

Occupancy: 0

Access:
Access is from the exterior of the building.

Other:
- Permanent CMU partitions.
- Extend to underside of structure above.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B203002	Solid Doors	Heavy-Duty Insulated Steel Doors	1 pair	Pair 3'-0" x 6'-8"	
D203003	Floor Drain	Room Floor Drain	1		

ENTRANCE FACILITY (MAIN TELECOMMUNICATIONS ROOM)

Space Characteristics

Function:
Main Communications Room.

Special Dimensions:

Acoustics:
Acoustic isolation from this space is important. Provide a minimum Sound Transmission Class (STC) of 42 for all paths through walls adjacent to occupied spaces. Airborne STC and Impact Insulation Class (HC) for floor/ceiling assemblies shall be equal to or greater than the STC value for the walls.

Occupancy: 0

Access:
Provide access from the interior.

Other:
- Permanent CMU partitions.
- Extend walls to underside of structure above.
- Stack Telecommunications Rooms

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Insulated Steel Doors	1	3'-0" x 6'-8 minimum"	
D501005	Panels	Panelboard	1		Dedicated to serving electrical loads within this room.
D503003	Telecommunications System	NiPRNet Outlets	1		Provide at least the number indicated. The final quantity will be based on the results of user interviews.

COMMUNICATION ROOM(S)

Space Characteristics

Function:
Communications equipment serving additional floors or entities.

Special Dimensions:

Acoustics:
Acoustic isolation from this space is important. Provide a minimum Sound Transmission Class (STC) of 42 for all paths through walls adjacent to occupied spaces. Airborne STC and Impact Insulation Class (HC) for floor/ceiling assemblies shall be equal to or greater than the STC value for the walls.

Occupancy: 0

Access:
Access is from the corridor.

Other:
- Permanent CMU partitions.
- Stack Telecommunications Rooms

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Steel Doors	1	3'-0" x 6'-8" minimum	
D503003	Telecommunications System	NiPRNet Outlets	1		Provide at least the number indicated. The final quantity will be based on the results of user interviews.

STAIR(S)

Space Characteristics

Function:
Vertical circulation.

Special Dimensions:

Acoustics:
Noise control is not important to this space.

Occupancy: 0

Access:
Access is from the interior and to the exterior. Locate main stair adjacent to Lobby/Entrance.

Other:
- Permanent CMU partitions.
- Provide double-doors at top and bottom of one stair, unless another means can be developed to facilitate movement of furniture and other heavy items between floors.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B203002	Solid Doors	Steel Doors	As Required	3'-0" x 6'-8" minimum	Exit to exterior.
C102001	Standard Interior Doors	Steel Doors	As Required	3'-0" x 6'-8" minimum	Access to interior areas.

RIVERINE TASK UNIT COMMANDER OFFICE (EACH of 2)

Function:
Office work in support of training mission. Command Office.

Special Dimensions:

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 42 is required.

Occupancy: 4

Access:
Access is via the Riverine Task Unit Office (Team Room)..

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.
- Provide one 50" flat panel LCD as collateral equipment

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	B202001	Windows	Fixed Aluminum Windows	1 minimum	3-feet wide x 4-feet high	
	C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	STC 42 minimum
	C102007	Interior Door Hardware	Cipher Lock	1		1 per door
	D503003	Telecommunications System	NiPRNet Outlets	7		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications System	SiPRNet Outlets	5		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503007	Television Systems	CATV Outlet	1		.
	E201002	Window Treatments	Window Blinds	1		One per window.

RIVERINE TASK UNIT OFFICE (TEAM ROOM) (EACH of 2)

Function:
Office work in support of training mission.

Special Dimensions:

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 42 is required.

Occupancy: 11

Access:
Access is via the corridor.

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	B202001	Windows	Fixed Aluminum Windows	1 minimum	3-feet wide x 4-feet high	
	C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	STC 42 minimum
	C102007	Interior Door Hardware	Cipher Lock	1		1 per corridor door.
	D503003	Telecommunications System	NiPRNet Outlets	14		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications System	SiprNet Outlets	14		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
	D503007	Television Systems	CATV Outlet	1		.
	E201002	Window Treatments	Window Blinds	1		One per window.

MISSION BRIEFING ROOM (EACH)

Space Characteristics

Function:
Conference space.

Special Dimensions:

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 45 is required.

Occupancy: 35 in each room. Up to 90 for the combined room.

Access:
Access is from the corridor.

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.
- Combine Tactical Operations Center (TOC) with the Briefing Room that abuts the COMM Room.
- This space must not have any exterior windows.
- The Mission Briefing Room that contains the TOC will be connected by intercom with the following spaces:
  - COMM Room
  - Other Mission Briefing Room
  - Squadron Interoperability Task Unit Office
  - Boat Maintenance Building
  - River Ops Control Watch Station.
- Provide one 50" flat panel LCD for briefing in each Briefing Room plus one additional 50" flat panel LCD in the side shared with TOC. The 3 screens are collateral equipment.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C101003	Retractable Partitions	Operable Panel Partition	1	As Required	Wall between Mission Briefing Rooms; STC 45 minimum.
C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	STC 45 minimum
C102007	Interior Door Hardware	Cipher Locks	As Required		1 per door
C103003	Marker Boards and Tack Boards	Marker Board	1	48" x 120"	
C103099	Other Interior Specialties	Projection Screen	1	72" x 96" minimum	Roll-up via internal electric motor into recessed concealed housing.
E104001	Smart Board	Smart Board	1	To be determined	Government Furnished/Government Installed (GFGI)
E104002	Overhead Projector	Overhead Projector	1		Government Furnished/Government Installed (GFGI)
E104003	VTC Equipment	Video Teleconferencing Equipment	As Required		Government Furnished/Government Installed (GFGI)
D503003	Telecommunications Systems	NiPRNet Outlets	8		Max 10'-0" apart along all walls. Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications Systems	SiPRNet Outlets	8		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications Systems	Ceiling Mounted Projector Outlets	As Required		Provide as indicated for briefing/training rooms.
D503005	Intercommunications Systems	Intercom Connection			Connect to spaces listed at left and to Quarterdeck in Building 2603.
D503007	Television Systems	CATV Outlet	2		

SQUADRON INTEROPERABILITY TASK UNIT COMMANDER OFFICE

Space Characteristics

Function:
Office work in support of training mission.

Special Dimensions:
See Space Tabulation.

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 45 is required.

Occupancy: 4

Access:
Access is via the Squadron Interoperability Task Unit Office.

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B202001	Windows	Fixed Aluminum Windows	1 minimum	3-feet wide x 4-feet high	
C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	STC 45 minimum
C102007	Interior Door Hardware	Cipher Lock	1		1 per door.
D503003	Telecommunications Systems	NiPRNet Outlets	7		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications Systems	SIPRNet Outlets	5		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications System	FAX Outlet	1		
D503007	Television Systems	CATV Outlet	2		
E201002	Window Treatments	Window Blinds	As Required		One per window.

SQUADRON INTEROPERABILITY TASK UNIT OFFICE

Space Characteristics

Function:
Office work in support of training mission.

Special Dimensions:
See Space Tabulation.

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 45 is required.

Occupancy: 8

Access:
Access Is from the corridor.

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B202001	Windows	Fixed Aluminum Windows	1 minimum	3-feet wide x 4-feet high	
C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	STC 45 minimum
C102007	Interior Door Hardware	Cipher Lock	1		1 per door.
D503003	Telecommunications Systems	NiPRNet Outlets	6		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications Systems	SIPRNet Outlets	5		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications System	FAX Outlet	1		
D503005	Intercommunications Systems	Intercom Connection			Connect to TOC in Mission Briefing Room.
D503007	Television Systems	CATV Outlet	2		
E201002	Window Treatments	Window Blinds	As Required		1 per window.

COMM ROOM (SECURE ROOM)

Space Characteristics

Function:
Office work in support of training mission.

Special Dimensions:
See Space Tabulation.

Acoustics:

Occupancy: 2
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 45 is required.

Access:
Access is via the corridor and to one of the Briefing Rooms.

Other:
- Permanent drywall or CMU partitions.
- Partitions to extend from structural floor to structural ceiling or roof above.
- Provide access to roof for placing antennas on a 10' x 10' platform.
- This room will contain "open storage." Design the enclosure for this room in accordance with SECNAVINST 5510.36, Exhibit 10A.
- Provide a patch panel system or conduit to support antenna field located on roof platform.

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
C102001	Standard Interior Doors	Sound Insulated Doors	2	3'-0" x 6'-8" minimum	STC 45 minimum
C102007	Interior Door Hardware	X09 Lock	1		Provide on corridor door
D503003	Telecommunications Systems	NiPRNet Outlets	4		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503003	Telecommunications Systems	SIPRNet Outlets	4		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503005	Intercommunications Systems	Intercom Connection			Connect to TOC in Mission Briefing Room.
D503007	Television Systems	CATV Outlet	1		

RIVER OPS CONTROL WATCH STATION

Function:
Maintain contact with boats before deployment, surveillance of boat launch/recovery area.

Special Dimensions:

Acoustics:
Acoustic privacy is important to this space. A minimum Sound Transmission Class (STC) of 42 is required.

Occupancy: 2

Access:
Access is via the corridor.

Other:
- Permanent drywall or CMU partitions.

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	B202001	Windows	Fixed Aluminum Windows	As Required		Provide no less than two exterior walls and no less than 10 linear feet of window per exterior wall. Tilt tops of windows out as required to provide the operators with maximum visibility to the launch/recovery area.
	C102001	Standard Interior Doors	Sound Insulated Doors	1	3'-0" x 6'-8" minimum	
	C103008	Counters	Solid Surface Counter	1		Provide for the entire length of the observation windows.and a minimum of 12' long at coffee mess.
	C103009	Cabinets	Hardwood Cabinets			Provide base and wall cabinets at the entire length of the coffee mess
	D503003	Telecommunications Systems	NiPRNet Outlets	2		Provide at least the number indicated. Quantity includes printers, copiers, and other peripherals. The final quantity will be based on the results of user interviews.
	D503003	Telecommunications Systems	SIPRNet Outlets	2		Provide at least the number indicated. Quantity includes printers, copiers, and other peripherals. The final quantity will be based on the results of user interviews.
	D503005	Intercommunications Systems	Intercom Connection			Connect to TOC in Mission Briefing Room.
	D503007	Television Systems	CATV Outlet	1		
	E201002	Window Treatments	Window Blinds	1		1 per window.
	D201004	Sinks	Kitchen Sink	1		Provide in cabinets at coffee mess.
	E109002	Food Service Equipment	Residential Garbage Disposal	1		

BOAT MAINTENANCE BUILDING BOAT SPACES

Function:
Space for loading/unloading 4 boats.

Special Dimensions:
As required to accommodate boats on trailers, including height.

Acoustics:
Acoustic privacy is not important to this space.

Occupancy: Varies

Access:
- Motor operated overhead doors provide access to the equipment yard.
- Hollow metal doors provide access to the Operations Building and exterior.
- Vault door provides access to the Gun and NVG Locker.
- Boat spaces are open to the maintenance space.

Other:

Space Characteristics	Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
	B2010	Exterior Walls	Split-Face CMU with Insulated Metal Wall Panels Above			
	B203002	Solid Doors	Insulated Steel Doors	As Required	3'-0" x 6'-8" minimum	Personnel doors.
	B203004	Overhead and Roll-up Doors	Coiling Overhead Doors	8	12' w x 16' h minimum	Two per boat to allow boats to be pulled through the building.
	D203003	Floor Drains	Trench Drains	As Required		Provide one below each boat. Connect to Oil/Water Separator in Maintenance Space.

BOAT MAINTENANCE BUILDING MAINTENANCE SPACE

Space Characteristics

Function:
Boat maintenance.

Special Dimensions:
As required to accommodate boats on trailers, including height.

Acoustics:
Acoustic privacy is not important to this space.

Occupancy: Varies

Access:
- Motor operated overhead doors provide access to the equipment yard.
- Maintenance space is open to the Boat spaces.

Other:

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B2010	Exterior Walls	Split-Face CMU with Insulated Metal Wall Panels Above			
B203002	Solid Doors	Insulated Steel Doors	As Required	3'-0" x 6'-8" minimum	Personnel doors for egress.
B203004	Overhead and Roll-up Doors	Coiling Overhead Doors	2		Allow boat to be pulled through the Maintenance Bay.
D109003	Overhead Cranes	Electric Crane	1	2-tons	Provide with hoist and trolley.
D201004	Sinks	Mop Sink	2		Provide one sink at each end of wall connecting the Boat Maintenance Building with the Operations Building
D201006	Drinking Fountains and Coolers	Electric Water Cooler	1		
D201099	Emergency Fixtures	Shower/Eyewash	As Required		Provide at 100-foot intervals along exterior walls. Keep this a minimum of 10 feet from any electrical device.
D203003	Floor Drains	Floor Drain	As Required		Provide 1 at each shower/eyewash.
D203003	Floor Drains	Trench Drains	As Required		Provide one below maintenance area and connect to Oil/Water Separator.
D209003	Interceptors	Oil/Water Separator	1		Serves all trench drains
D304007	Exhaust Systems	Ventilation Fans	As Required		Provide fans for ventilation of boat maintenance space.
D209005	Compressed Air System	Low Pressure Air System	4 drops		Non-Breathing air system.
D502001	Branch Wiring	240-Volt Outlets	4		
D503003	Telecommunications Systems	NiPRNet Outlets	2		Provide at least the number indicated. Quantity includes printers, copiers and other peripherals. The final quantity will be based on the results of user interviews.
D503005	Intercommunications Systems	Intercom Connection			Connect to TOC in Mission Briefing Room.

BOAT STORAGE BUILDING BOAT SPACES

Space Characteristics

Function:
Space for storage of 12 boats.

Special Dimensions:
As required to accommodate boats on trailers, including height.

Acoustics:
Acoustic privacy is not important to this space.

Occupancy: Varies

Access:
- Motor operated overhead doors provide access to the equipment yard.
- Hollow metal doors provide emergency egress.

Other:

Uniformat Level 4#	Uniformat Title	Description	Quantity	Size	Remarks
B2010	Exterior Walls	Split-Face CMU with Insulated Metal Wall Panels Above			
B203002	Solid Doors	Insulated Steel Doors	As Required	3'-0" x 6'-8" minimum	Personnel doors for egress.
B203004	Overhead and Roll-up Doors	Coiling Overhead Doors	6	26' w x 16' h minimum	One door per pair of boats to allow boats to be backed into each bay.
C101002	Demountable Partitions	Wire Mesh Partitions	2	Entire width x height of building	To separate the building into three sections of four boats.
C201003	Catwalks	Catwalks and Railings	See Drawing A-4 in Part 6		The catwalk behind the boats and exterior exit platforms and stairs are in the Base Bid. The catwalks, stairs, and removeable railings alongside boats are an Optional Bid Item.
D201006	Drinking Fountains and Coolers	Electric Water Cooler	3		One per building area.
D203003	Floor Drains	Floor Drain	As Required		.

6. ENGINEERING SYSTEMS REQUIREMENTS

A. SUPERSTRUCTURE

A10 FOUNDATIONS

Refer to Part 4 Section A10 for performance requirements of the building elements included in the foundation system.

SYSTEM DESCRIPTION

Provide the building foundation system in accordance with UFC 3-300-10N, "Design: General Structural Requirements." Foundations include all substructure elements supporting the new structures and equipment.

GENERAL SYSTEM REQUIREMENTS

Investigation results and preliminary recommendations are provided in the Geotechnical Report included in Part 6. The Contractor shall obtain the services of a professional engineer specializing in geotechnical engineering to perform any additional investigations and prepare recommendations and designs for site preparation and foundations. The Contractor shall provide the Contracting Officer with copies of any additional geotechnical recommendations, reports, and soil boring logs.

Based on the preliminary subsurface investigation, it is anticipated the foundation system for the buildings will utilize shallow spread footings and continuous strip footings constructed of reinforced concrete.

A1010 STANDARD FOUNDATIONS

A. Provide soil treatment for subterranean termite control in accordance with Part 4 Section A10 and Part 5 Section 02360.

A101001 Wall Foundations

A. Provide reinforced concrete wall foundations.

A101002 Column Foundations

A. Provide reinforced concrete column foundations.

A1020 SPECIAL FOUNDATIONS

A102001 Pile Foundations

A. Provide steel sheet piles with reinforced concrete encapsulation for new waterfront (quay) wall. Provide wall anchorage system consisting of tie rods with concrete deadmen or grouted drilled anchors.

B. Concrete encapsulation shall provide a smooth vertical waterside face extending from approximately elevation 4 to -2 feet.

C. Provide protective coating on all steel sheet piles. Coating shall conform to UFGS Specification 09 97 13.26, "Coating of Steel Waterfront Structures" and Section A10 in Part 4 of this RFP.

A102004 Dewatering

A. Dewater site as necessary for proper construction.

A1030 SLAB ON GRADE

A103001 Standard Slab on Grade

A. Provide reinforced concrete slab on grade to meet loading requirements indicated. Depress slab where necessary for raised floor systems, special floor finishes, and pits.

A103003 Inclined Slab on Grade

A. Provide minimum 14-foot widening section to existing concrete boat ramp abutting and for full length of existing ramp. Match grades of existing ramp. Provide rough broomed surface on ramp. See Section G20 of Program for additional requirements.

A103004 Trenches

A. Trenches, if required, are to be of reinforced concrete construction with waterproof joints and seals to prevent groundwater infiltration.

A103005 Pits and Bases

A. Construct of reinforced concrete with waterproof joints and seals to prevent groundwater infiltration.

B. SHELL

B10 SUPERSTRUCTURE

Refer to Part 4 Section B10 for performance requirements of the building elements included in the superstructure system.

SYSTEM DESCRIPTION

Provide the building structural system in accordance with UFC 3-300-10N, "Design: General Structural Requirements." The superstructure includes the above grade structural elements required for support of roof construction.

GENERAL SYSTEM REQUIREMENTS

The structural system shall be economical, durable, sustainable, and erected on the new building foundations.

Design and construct the structures such that they meets all gravity, soils, seismic, and wind loading and structural design requirements as set forth in the performance technical specifications in Part 4.

The systems shall be complete with expansion control and sleeved penetrations for services. They shall also include elements for support of any additional loads that will result from known items being added to the facility by others (such as cameras, televisions on racks, antennas, artwork, furniture, and equipment).

The new facility shall be designed and constructed within the Conventional Standoff Distances prescribed by UFC 4-010-01, "DoD Minimum Antiterrorism Standards for Buildings," in order to avoid the document's mandatory blast-hardening requirements.

The structural system shall consist of a steel frame with non-load bearing exterior concrete masonry walls. The Boat Storage Building may be a Pre-engineered Metal Building.

B1010 FLOOR CONSTRUCTION

A. First floor slab may be conventional slab on grade. In multi-story areas, provide reinforced concrete floor slab with or without composite steel deck.

B101001 Structural Frame

A. Structural frame elements may include columns, beams, trusses, and/or joists.

B. The roof structure of the boat maintenance bay space shall be capable of supporting a 2-ton bridge crane as described in Part 3 and Part 4, Section D10, "Conveying."

C. All components of the structural frame whether 'exterior' or 'interior' shall receive a multi-coat coating system designed for severe marine environments.

B101002 Structural Interior Walls

A. Structural interior walls may include concrete and masonry provided other requirements including acoustic transmission and antiterrorism are satisfied.

B. Consider the need for future flexibility in the interior space layout while deciding on locations for any interior load bearing walls.

B101003 Floor Decks and Slabs

A. First floor slab may be conventional slab on grade. In multi-story areas, provide reinforced concrete floor slab with or without composite steel deck.

B101004 Balcony Construction

A. Exterior balcony floors shall be concrete. Design and construct exterior balconies to drain and with the top of the balcony high point 3/4" below the interior floor elevation.

B101005 Ramps

A. Provide ramps in accordance with the requirements of this section and other portions of this RFP.

B1020 ROOF CONSTRUCTION

B102001 Structural Frame

A. Structural frame elements may include columns, beams, trusses, and/or joists.

B102002 Structural Interior Walls

A. Structural interior walls may include concrete and masonry provided other requirements including acoustic transmission and antiterrorism are satisfied.

B. Consider need for future flexibility in the interior space layout while deciding on locations for any interior load bearing walls.

B102003 Roof Decks and Slabs

A. Provide metal roof structure for standing seam metal roof.

B102004 Canopies

A. Provide foundations, structural support system, and standing seam metal roofing for all new canopies.

B20 EXTERIOR ENCLOSURE

SYSTEM DESCRIPTION

Exterior enclosure shall include exterior walls, exterior windows, and exterior doors.

B2010 EXTERIOR WALLS

B201001 Exterior Skin

A. The primary exterior material of the Operations Building and Boat Maintenance Building shall be integrally colored CMU (split face, split face ribbed, and smooth face) to match existing adjacent SOF structures. The exterior of the Boat Storage Building shall be integrally colored CMU (split face, split face ribbed, and smooth face) to match the other buildings on the site up to 6 feet above grade with metal panels above.

B. CMU design and details to be consistent with adjacent SOF facilities.

C. Back-up wall system for CMU veneer shall be CMU.

B201002 Insulation and Vapor Retarders

A. Provide insulation and vapor retarder in exterior walls.

B201003 Interior Skin

A. Interior face of exterior walls shall be exposed CMU or furred gypsum board.

B. Where the interior face of exterior walls in utility spaces, work spaces, including the Cage area, the Armory, electrical and mechanical spaces, and boat maintenance and storage spaces, does not serve as backing for thermal insulation, these surfaces can be exposed CMU. Otherwise, they will be furred gypsum board.

C. The interior face(s) of exterior walls in all other spaces in the Operations Building shall be furred gypsum board.

D. If showers have one or more exterior walls, the interior face of those walls shall be furred cementitous backing units.

B201005 Exterior Louvers and Screens

A. Provide exterior louvers and screens, where required, that match the finish of the windows and detailed to integrate with the architecture of the buildings, as appropriate to the design of the buildings.

B201006 Sun Control Devices (Exterior)

A. Provide fixed type. Sun control devices, including awnings, louvers, fixed overhangs, etc., shall be detailed to integrate with the architectural wall system.

B. Provide a covering for the main entrance door to the Operations Building by way of a permanent 6-foot deep structure or by recessing the door a minimum of 6 feet.

B201007 Balcony Walls and Handrails

A. Exterior railings shall include metal railing assemblies.

B201008 Exterior Soffits

A. Where occurring, provide exterior soffit system of pre-finished metal.

B201009 Screen Wall

A. Provide screen walls where required to screen mechanical units, electrical substations, loading areas, and trash receptacles. Screen walls shall be compatible with the buildings' architecture.

B201010 Exterior Coatings

A. Provide field applied exterior coatings for all items that are not pre-finished, and to pre-finished items when required to provide a color other than a standard pre-finished color.

B201099 Other Exterior Walls

A. Flashing for wall penetrations shall be aluminum or stainless steel.

B2020 EXTERIOR WINDOWS

A. Windows shall be provided in each area of the Operations Building and Boat Maintenance Building that is regularly occupied. Exterior windows shall be pre-finished aluminum and be resistant to impact by wind-borne debris per IBC 1609. Windows shall meet Antiterrorism requirements.

B. Provide natural light for the Boat Storage Building by use of clerestory windows.

B202001 Windows

A. Windows shall be fixed.

B. The design and configuration of the windows in the River Ops Control Watch Station shall provide maximum visibility for the operators. Provide special glazing and slope in from the tops of the windows as necessary to enhance visibility.

B202004 Exterior Glazing

A. Glazing color shall match existing that used SOF buildings.

B2030 EXTERIOR DOORS

B203001 Glazed Doors

A. The main entrance door of the Operations Building shall be glazed. Provide vision glazing in other exterior doors where it is deemed advantageous to be able to see through the door, either for safety of pedestrian traffic, or other functional reasons.

B. All exterior glazed doors and frames shall be field-painted, galvanized hollow metal.

C. Glazing shall match the window glazing.

B203002 Solid Doors

A. All exterior solid doors and frames shall be field-painted, galvanized hollow metal.

B203004 Overhead and Roll-Up Doors

A. Doors for movement of boats shall be coiling type. Doors shall have automatic operation with a manual override.

B203006 Door Hardware

A. Door hardware finish shall be satin stainless steel.

B30 ROOFING

Refer to Part 4 Section B30 for performance requirements of the building elements included in the roofing system.

SYSTEM DESCRIPTION

Steep slope roofing system is required for this project. The steep slope roofing system that is acceptable includes metal.

Internal roof drains are not allowed. Built-in gutter systems where drainage passes through an interior space or is concealed in the exterior cavity wall are not allowed.

Refer to UFC 3-110-06, “Roofing,” and UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements” for additional roofing requirements.

B3010 ROOF COVERINGS

A. Use structural standing seam metal roofing for this project.

B301001 Roof Finishes

A. The roofs in this project shall be pre-finished galvalume.

B301003 Roof Insulation

A. Roof insulation shall be rigid boards.

B301004 Flashings and Trim

A. Flashings shall be stainless steel or pre-finished aluminum.

B301005 Gutters and Downspouts

A. Gutters and downspouts shall be pre-finished aluminum.

B301006 Roof Openings and Supports

A. Provide flashings and/or curbs for items that penetrate the roof in a material recommended by the roof system manufacturer.

B301099 Other Roofing

A. Provide lightning protection as required by other sections of this RFP.

C. INTERIORS

C10 INTERIOR CONSTRUCTION

Refer to Part 4 Section C10 for performance requirements of the building elements included in the interior construction systems.

SYSTEM DESCRIPTION

Interior construction includes interior partitions, interior doors, and fittings.

Provide durable construction appropriate to the buildings use as a training facility. Acoustic properties of materials, as well as durability, shall be considered during material selection.

GENERAL SYSTEMS REQUIREMENTS

See “Room Requirements” for specific requirements on “Partitions,” “Interior Doors,” and “Fittings.”

C1010 PARTITIONS

A. All interior partitions shall be concrete masonry, metal studs with gypsum board on each side, demountable (wire mesh), or retractable, as indicated in “Room Requirements.”

C101001 Fixed Partitions

A. Provide fixed interior partitions, except where demountable (wire mesh) or retractable partitions are specifically required by the “Room Requirements.”

C101002 Demountable Partitions

A. Demountable partitions include wire mesh partitions used in the armory and in the Boat Storage Building.

C101003 Retractable Partitions

A. Retractable partitions include operable panel partitions as used to divide the briefing room.

C101004 Interior Balustrades and Screens

A. Provide balustrades where required by code. Provide screens where required to prohibit view of a particular area as identified in User interviews.

C101005 Interior Windows

A. Interior windows shall be aluminum.

C101007 Interior Glazing

A. Interior glazing shall be clear glass, wire glass, laminated glass, or tempered glass.

C101008 Joint Sealant

A. Provide sealant for vertical and horizontal joints.

C1020 INTERIOR DOORS

A. All interior doors shall be wood or hollow metal in hollow metal frames.

B. Provide vision glazing in doors where it is required by the “Room Requirements” portion of this RFP, or it is deemed advantageous to be able to see through the door, either for safety of pedestrian traffic, or other functional reasons.

C. Provide for special door hardware, such as combination locks at doors so indicated in “Room Requirements.”

C102001 Standard Interior Doors

A. In general, interior doors shall be solid core wood, except where hollow metal doors are required to meet a fire rating or are called for under “Room Requirements.” All interior door frames shall be hollow metal.

B. Provide vision glazing in doors where it is required by the “Room Requirements” portion of this RFP, or it is deemed advantageous to be able to see through the door, either for safety of pedestrian traffic, or other functional reasons.

C102003 Fire Doors

A. These doors may be wood. Use hollow metal if wood doors are not able to meet the rating required. Provide fire (and smoke) doors where required.

C102007 Interior Door Hardware

A. Provide all special door hardware needed to meet secure room criteria including cipher locks or X09 locks as indicated.

C102098 Other Interior Specialty Doors

A. Provide access doors in partitions and/or ceilings where required.

C1030 FITTINGS

C103001 Compartments, Cubicles and Toilet Partitions

A. Provide toilet partitions in all heads with more than one water closet or urinal. Provide toilet partitions as indicated in Section 3, “Room Requirements” portion of this RFP.

C103002 Toilet and Bath Accessories

A. Provide toilet accessories in all heads and showers as indicated in Section 3, “Room Requirements” portion of this RFP.

C103003 Marker Boards and Tack Boards

A. Provide marker boards and/or tack boards as indicated in “Room Requirements.”

C103004 Identifying Devices

A. Provide identifying device for all rooms and spaces.

C103005 Lockers

A. Provide in accordance with CID Package.

C103006 Shelving

A. Provide in accordance with CID Package.

C103007 Fire Extinguisher Cabinets

A. Provide recessed fire extinguisher cabinets for all fire extinguishers required in finished spaces. Provide brackets for all fire extinguishers located in mechanical and electrical spaces.

C103008 Counters

A. Provide 100% solid surface acrylic countertops as indicated in “Room Requirements.”

C103009 Cabinets

A. Provide built-in solid wood cabinets as indicated in “Room Requirements.”

C103011 Firestopping Penetrations

A. Provide firestopping for all penetrations of fire rated construction.

C103012 Sprayed Fire-Resistive Materials

A. Provide sprayed-on fire resistive materials as required to achieve fire rating required by Code.

C103099 Other Interior Specialties

A. Provide electrically-operated, recessed ceiling-mounted projection screens at locations as indicated in “Room Requirements.”

B. Provide recessed entrance mats at all pedestrian entrances to the Operations Building.

C20 STAIRS

Refer to Part 4 Section C20 for performance requirements of the building elements included in this section.

SYSTEM DESCRIPTION

Stairs, including stair construction and stair finishes, shall be provided as required by the building code to provide egress from the building from above grade level floors. Stairs shall meet all requirements of the building code.

Catwalks shall be provided in the Boat Maintenance Building.

C2010 STAIR CONSTRUCTION

C201001 Interior Stair Structure

A. Interior stairs in the Operations Building shall be constructed of steel with concrete filled pans.

B. Handrails and guardrails shall be pre-finished aluminum. Handrails and guardrails shall present a smooth, unbroken surface throughout the length of the stair.

C201002 Exterior Stair Structure

A. Exterior stairs and landings in the Operations Building and the Boat Storage Building shall be constructed of steel with concrete filled pans.

B. Handrails and guardrails shall be pre-finished aluminum. Handrails and guardrails shall present a smooth, unbroken surface throughout the length of the stair.

C201003 Catwalks

A. Catwalks in the Boat Storage Building shall be constructed of galvanized steel.

B. Handrails for catwalks along side boats in the Boat Storage Building shall be removeable and shall be prefinished aluminum. Handrails and guardrails shall present a smooth, unbroken surface.

C2020 STAIR FINISHES

A. Concrete is an acceptable finish for exterior stair treads. Steel elements of stairs and catwalks shall be primed and painted.

B. Handrails and guardrails shall be aluminum finished to withstand extreme wear conditions in a color to match the color of the window frames. Handrails and guardrails shall present a smooth, unbroken surface throughout the length of the stair.

C30 INTERIOR FINISHES

Refer to Part 4 Section C30 for performance requirements of the building elements included in interior finishes.

SYSTEM DESCRIPTION

Interior finishes include wall finishes, floor finishes, wall base finishes, and ceiling finishes.

Provide aesthetically pleasing, functional, durable finishes appropriate to the buildings use as a training facility. Acoustic properties of materials, as well as durability and ease of maintenance, shall be considered during material selection. Maximize the use of sustainable materials.

GENERAL SYSTEMS REQUIREMENTS

See “Room Requirements” for specific requirements on “Interior Finishes.”

C3010 WALL FINISHES

A. Provide porcelain tile in all heads and showers. All other interior wall finishes shall be painted CMU or gypsum board in the Operations building and Boat Maintenance Building.

B. Interior finishes in the Boat Storage Building shall be CMU up to 6 feet above grade with factory-finished metal wall panels above the CMU.

C301001 Concrete Wall Finishes

A. Concrete on interior walls shall be painted unless covered by furred gypsum board or porcelain tile.

C301003 Gypsum Wallboard Finishes

A. In general, provide painted 5/8 inch type X gypsum board for interior walls. Use moisture-resistant wallboard in heads and cementitious backing units as tile backing in showers.

B. Provide impact-resistant gypsum board in all corridors and in the main entry to the Operations Building.

C301004 Tile Wall Finishes

A. Provide porcelain tile for walls in heads and showers.

C301005 Painting to Walls

A. Paint as specified elsewhere in this RFP.

B. Paint exposed structural elements including, but not limited to, columns and bracing in the Boat Maintenance and Boat Storage spaces and wherever else building structural elements are exposed in service spaces (mechanical and electrical rooms).

C. Columns, bracing, and similar structural elements, throughout the Operations Building, including finished offices, administrative areas, briefing rooms, entries, corridors, and similar areas, shall be concealed behind gypsum wall board or CMU.

C3020 FLOOR FINISHES

A. Floor finishes shall be as indicated in “Finish Schedule.”

C302001 Tile Floor Finishes

A. Provide porcelain tile floors in heads and showers.

C302004 Resilient Floor Finishes

A. Provide resilient flooring at locations indicated in “Finish Schedule.”

C302005 Carpeting

A. Provide carpeting at locations indicated in “Finish Schedule.”

C302007 Painting and Staining Floors

A. Provide painted floors where indicated in “Finish Schedule.”

C302008 Wall Base Finishes

A. Provide at all locations indicated in “Finish Schedule.”

C302099 Other Flooring and Floor Finishes

A. Exposed concrete floors shall be coated with a sealer appropriate to the use of the space.

C3030 CEILING FINISHES

A. Ceiling finishes shall be as indicated in the “Finish Schedule” portion of this RFP.

C303001 Exposed Concrete Finishes

A. Provide paint to exposed concrete surfaces.

C303003 Gypsum Wallboard Ceiling Finishes

A. Provide painted, suspended, moisture-resistant gypsum board ceilings in the main entry and in heads and showers in the Operations Building.

C303004 Acoustical Ceiling Tiles and Panels

A. Primary ceiling finish in finished spaces shall be 24 inch by 24 inch by 3/4 inch minimum thickness suspended lay-in acoustical panel ceiling system. Use a square tegular edge on the tiles.

C303006 Painting and Staining Ceilings

A. Paint as specified elsewhere in the RFP.

B. The ceiling finish in the Boat Maintenance and Storage Buildings and various spaces within the Operations Building will be the painted structural elements (beams, purlins, columns, bracing, etc.) and roof deck above. These items will be painted with a multi-coat epoxy coating system that is suitable for severe marine environments.

C303007 Suspensions Systems

A. Provide aluminum or non-corroding steel suspension system for lay-in acoustical tiles.

D. SERVICES

D10 CONVEYING

SYSTEM DESCRIPTION

Refer to Part 4 Section D10 for performance requirements of the building elements included in this section.

GENERAL SYSTEMS REQUIREMENTS

D1090 OTHER CONVEYING SYSTEMS

D109003 Overhead Cranes

A. Provide a two-ton overhead electric underrunning crane in the Boat Maintenance Bay. Refer to the prescriptive specification in Part 4 of this RFP for crane requirements. The clear hook height shall not be less than 16 feet above the finished floor.

B. The Contractor shall be responsible for ensuring that the crane satisfies the testing and certification requirements detailed in Part 4 of this RFP.

D20 PLUMBING

Refer to Part 4 Section D20 for performance requirements of the building elements included in the plumbing system.

SYSTEM DESCRIPTION

The plumbing systems for the Riverine and Combatant Craft Operations Facility consist of all fixtures, potable cold and hot water piping and

equipment, piping insulation, water heating equipment, sanitary waste and vent piping systems, and other specialty piping and equipment within 5 feet of the building. Refer to Building Requirements, Space Tabulations Section of the Project Program for building occupancy levels.

GENERAL SYSTEM REQUIREMENTS

Provide working space around all equipment. Provide concrete pads under all equipment. Provide all required fittings, connections, and accessories required for a complete and usable system. All equipment shall be installed per the criteria of RFP Section D20 and the manufacturer's recommendations. Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall."

D2010 PLUMBING FIXTURES

A. Provide quantity and type of plumbing fixtures required for the occupancy, use, and functions described for this facility. Refer to Room Requirements section for additional specific requirements for spaces with plumbing fixtures. Provide accessible fixtures on the first floor only.

D201001 Water Closets

A. Refer to Room Requirements section for the number and type of water closets required.

B. Provide flush valve type water closets in all heads.

C. Provide accessible flush valve type water closets where required.

D201002 Urinals

A. Refer to Room Requirements section for the number and type of urinals required.

B. Provide flush valve type urinals.

C. Provide accessible flush valve type urinals where required.

D201003 Lavatories

A. Refer to Room Requirements Section for the number and type of lavatories required.

B. Provide wall mounted lavatories.

C. Provide accessible lavatories where required.

D201004 Sinks

A. Refer to Room Requirements Section for the number and type of sinks required.

B. Provide mop sinks as required in Room Requirements.

C. Provide countertop sink for coffee mess.

D201005 Showers/Tubs

A. Refer to Room Requirements Section for the number of showers required.

B. Provide accessible showers where required.

C. Provide push-button controls for accessible showers.

D201006 Drinking Fountains and Coolers

A. Refer to Room Requirements Section for the number and type of water coolers required.

B. Provide handicapped units where required.

D201099 Emergency Fixtures

A. Provide emergency combination shower/eyewash stations where required. Refer to Room Requirements Section.

D2020 DOMESTIC WATER DISTRIBUTION

D202001 Pipes and Fittings

A. Provide copper tubing and fittings for above ground and buried piping.

D202002 Valves and Hydrants

A. Provide valves at water supplies to fixtures and to provide ease of maintenance as required in the IPC. Provide hose bibbs in mechanical rooms. Provide wall hydrants along the building exterior such that all points along the perimeter can be reached with a 100 foot long hose.

D202003 DOMESTIC WATER EQUIPMENT

A. Provide reduced pressure principle type backflow preventer at the service entrance inside the mechanical room.

B. Provide reduced pressure principle type backflow preventer at all make-up water lines inside the mechanical room.

C. Provide water meter. Provide water meter that can be read from the EMCS (Energy Management Control System).

D. Provide electric water heater for heating of domestic water.

E. Provide instantaneous electric water heaters for remote locations.

D202004 Insulation and Identification

A. Provide mineral fiber insulation with vapor barrier on domestic water (hot and cold) supply and recirculation piping. Provide identification for piping and equipment.

D202005 Specialties

A. Provide ice maker connector box for refrigerator.

B. Provide valve box for buried valves.

D202099 Other Domestic Water Supply

A. Provide piping supports in accordance with the IPC. Provide inspections, disinfection, and testing in accordance with the IPC.

D2030 SANITARY WASTE

D203001 Waste Pipe and Fittings

A. Provide cast iron hubless pipe and fittings with coupling joints for above ground installation.

B. Provide plastic PVC piping, fittings, and solvent cement for below ground installation.

D203002 Vent Pipe and Fittings

A. Provide cast iron hubless pipe and fittings with coupling joints for above ground installation.

D203003 Floor Drains

A. Provide in mechanical rooms, restrooms, plumbing chase areas, emergency shower/eyewash stations, and to receive condensate from air handling equipment.

B. Floor drains are to be corrosion-resistant or brass.

C. Provide trap primers or deep seal traps.

D2040 RAIN WATER DRAINAGE

D204001 Pipe & Fittings

A. Provide Cast Iron hubless pipe & fittings or PVC fittings, and solvent cement.

D204003 Rainwater Drainage Equipment

A. Provide expansion joints as required to receive conductor pipe.

D204004 Insulation & Identification

A. Provide the same as domestic water piping.

D2090 OTHER PLUMBING SYSTEMS

D209003 Interceptors

A. Provide an oil/water separator for the trench drains and floor drains in the Boat Maintenance Building.

D209005 Compressed Air System (Non-Breathing)

A. Provide air compressor, refrigerated air dryer, aftercooler, and receiver. Provide piping and compressed air drops with quick disconnects throughout the work areas to allow connection on pneumatic tools, air guns, etc. Provide approximately (2) drops per Boat Maintenance bay.

D30 HVAC

Refer to Part 4 Section D30 for performance requirements of the building elements included in the HVAC system.

SYSTEM DESCRIPTION

Provide heating, ventilating, and air conditioning (HVAC) systems for the Riverine and Combatant Craft Operations Facility that attains the following objectives: occupant comfort, indoor air quality, acceptable noise levels, energy efficiency, reliable operation, and ease of maintenance. Refer to Building Requirements, Space Tabulations Section of the Project Program for building occupancy levels.

Direct expansion multi-zone systems, direct expansion variable air volume systems, and thru-the-wall units are not acceptable. Economizer cycles shall not be used.

GENERAL SYSTEM REQUIREMENTS

Provide working space around all equipment. Provide all required fittings, connections, and accessories required for a complete and usable system.

All equipment shall be installed per the criteria in RFP Section D30 and the manufacturer's recommendations. Where the word "should" is used in manufacturer's instructions, substitute the word "shall."

Provide air conditioning and heating for spaces as indicated and for the following design conditions:

Outside Conditions					
Summer	33.3	Degrees C dry bulb	Winter	-0.56	Degrees C
	92	Degrees F dry bulb		31	Degrees F
	27.8	Degrees C wet bulb			
	82	Degrees F wet bulb			
Inside Conditions					
Summer	23.8	Degrees C dry bulb	Winter	20	Degrees C
	75	Degrees F dry bulb		68	Degrees F
	50	%RH			

Heating & Ventilating Inside Conditions					
Summer	35	Degrees C dry bulb	Winter	12.8	Degrees C
	95	Degrees F dry bulb		55	Degrees F

Ventilated Storage and Work Shops: Ventilation systems shall be designed to maintain spaces within 3 degrees F of the supply air temperature during summer conditions.

Provide Ventilation rates and systems per the latest edition of ASHRAE Standard 62, "Ventilation for Acceptable Indoor Air Quality." Pre-condition (heat, cool, and dehumidify to room design conditions) all outside air prior to admission into occupied spaces. Provide supply ventilation for mechanical rooms to limit the temperature to not more than 10 degrees F above ambient.

The HVAC system shall provide each zone with the choice of heating or cooling year round unless otherwise indicated. Each zone shall have its own limited range of control, as allowed by the control system central workstation.

Zone the HVAC system as follows:

All rooms with similar exposure and use may be considered as a single zone.

All conference and meeting rooms shall be zoned individually.

All corner offices shall be zoned individually.

Riverine Operations Building:

The HVAC system for the Riverine Operations Building shall use an air-cooled chiller that provides chilled water to (2) variable air volume air handlers. One air handler shall be located on each floor. The air handlers shall supply conditioned air to zoned variable air volume units with hot water heating coils.

Boat Maintenance Building Boat Spaces:

The Boat Maintenance bays shall be heated and ventilated only. Heating shall be provided by hot water unit heaters.

Boat Storage Building:

The Boat Storage Building shall be heated and ventilated only. Heating shall be provided by electric unit heaters.

Noise levels shall comply with the requirements in the ASHRAE Applications Handbook.

Material and Equipment Qualifications: All materials and equipment shall have been in satisfactory commercial or industrial use for 2 years prior to the bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturer's catalogs, or brochures during the 2-year period.

Motors: Single-phase fractional-horsepower alternating-current motors shall be high efficiency types corresponding to the applications listed in NEMA MG 11. Select polyphase motors based on high efficiency characteristics relative to the applications as listed in NEMA MG 10. Additionally, all polyphase squirrel-cage medium induction motors with continuous ratings shall meet or exceed energy efficient ratings per Table 12-10 of NEMA MG 1. Provide controllers for 3-phase motors rated 0.75 kW (1 hp) and above with phase voltage monitors designed to protect motors from phase loss and over/under-voltage. Provide means to prevent automatic restart by a time adjustable restart relay. For packaged equipment, the manufacturer shall provide controllers including the required monitors and timed restart. Provide reduced voltage starters for all motors 25 hp and larger.

Provide housekeeping pads and vibration isolators under all floor-mounted equipment.

All mechanical equipment and coils shall have painted or coated finishes that pass a salt-spray test conducted per ASTM B117 for duration of at least 500 hours.

All equipment shall be installed per the manufacturer's recommendations.

D3010 ENERGY SUPPLY

D301002 Gas Supply System

A. Provide a natural gas supply system to the heating equipment.

B. Provide a gas meter that can be read from the EMCS (Energy Management Control System).

D3020 HEAT GENERATING SYSTEMS

A. The heating load for this facility shall be served by 1 boiler providing 100% of the load.

D302002 Hot Water Boiler

A. Provide a gas-fired firebox type boiler for an input under 1,000 MBTUH or a gas-fired modified scotch marine type boiler for an input equal to or over 1,000 MBTUH.

D302006 Equipment Thermal Insulation

A. Provide insulation for hot and chilled water pumps and equipment. Provide vapor barrier for chilled water applications.

D3030 COOLING GENERATING SYSTEMS

D303001 Chilled Water Systems

A. Provide air-cooled chiller using a constant volume pumping system. The cooling load for this facility shall be served by 1 chiller providing 100% of the load.

B. Provide insulation on all chilled water equipment.

C. Provide complete start-up and operational testing of chiller equipment.

D303002 Direct Expansion Systems

A. Provide dedicated air cooled condensing units and associated air handling unit with ducted air distribution for all Communication and Server Rooms.

D3040 DISTRIBUTION SYSTEMS

D304001 Air Distribution, Heating and Cooling

A. Provide insulated, galvanized steel ductwork constructed, braced, reinforced, installed, supported, and sealed per the IMC and SMACNA standards.

B. Provide Variable Air Volume (VAV) system using ducted return.

C. Provide VAV Units to serve the air conditioned zones.

D304003 Hot Water Distribution Systems

A. Provide insulated steel or copper hot water supply and return piping to serve the HVAC equipment throughout the facility.

D304006 Chilled Water Distribution Systems

A. Provide a constant volume pumping system to serve the HVAC equipment throughout the facility.

B. Provide insulated, steel or copper chilled water supply and return piping to serve the HVAC equipment throughout the facility.

C. Provide cellular glass insulation on all above ground chilled water distribution piping.

D. Provide valves and related chilled water system appurtenances.

E. Provide air control and chemical treatment equipment for chilled water system.

F. Provide system flushing and start-up for chilled water system.

G. Provide 100% back-up pumping capability.

D304007 Exhaust Systems

A. Provide ducted exhaust ventilation systems and exhaust fans to serve all ventilated zones of the facility. Provide in-line, rooftop or ceiling centrifugal exhaust fan(s).

D304008 Air Handling Units

A. Provide central station, variable volume air handlers.

D304099 Other Distribution Systems

A. Provide in-line or base mounted circulating pumps.

B. Provide a chemical treatment system for the hot and chilled water systems.

D3050 TERMINAL AND PACKAGE UNITS

D305002 Unit Heaters

A. Provide hot water unit heaters to serve the heating requirements of the Boat Maintenance area of the facility.

D305005 Electric Heating

A. Provide electric unit heaters to serve the heating requirements of the Boat Storage area of the facility.

D3060 CONTROLS AND INSTRUMENTATION

D306001 HVAC Controls

A. Provide a complete Direct Digital Control (DDC) system for the facility which will communicate with the existing DDC system. The existing DDC system is Siemens APOGEE. The system shall utilize electronic equipment controllers.

D306002 Electronic Controls

A. Provide programmable thermostats for small DX systems.

D3070 SYSTEMS TESTING AND BALANCING

A. Provide complete Testing and Balancing (TAB) of all air and water distribution systems and HVAC equipment.

D307001 Water Side Testing and Balancing – Heating & Cooling

A. Refer to Paragraph D3070.

D307002 Air Side Testing and Balancing - Heating, Cooling and Exhaust

A. Refer to Paragraph D3070.

D307003 HVAC Commissioning

A. Provide level 2 commissioning for all HVAC systems.

D3090 OTHER HVAC SYSTEMS AND EQUIPMENT

D309001 General Construction Items

A. Comply with the Force Protection Criteria as described in UFC 4-010-01.

D40 FIRE PROTECTION

(INCLUDES D503001 FIRE ALARM SYSTEMS)

Refer to Part 5 Sections D40 and D503001 for performance requirements of the building elements included in the fire protection systems.

SYSTEM DESCRIPTION

Provide an integrated voice evacuation fire alarm and suppression system capable of notifying building occupants and controlling any fire that may start inside the facility.

GENERAL SYSTEM REQUIREMENTS

Provide working space around all equipment. Provide concrete pads under all equipment. Provide all required fittings, connections, and accessories required for a complete and usable system. All equipment shall be installed per the criteria of RFP Section D40 and the manufacturer's recommendations. Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall."

All Design Documents, (i.e., Building Code/Life Safety Analysis, plans, specifications, calculations, etc.) developed for Sections D40 and D503001 shall be prepared by, or under the supervision of the Design/Build Contractor's Registered Professional Fire Protection Engineer (DBFPE). The DBFPE shall have a firm contractual agreement with the Design/Build Contractor and shall not be working for any of the subcontractors on the project he is reviewing. The DBFPE shall have obtained professional registration in the field of fire protection and shall be working exclusively in this field.

ALL construction submittals, (i.e., shop drawings, calculations, catalog cuts, etc.) shall be reviewed and approved by the DBFPE prior to submission to NAVFAC Southeast for approval.

The DBFPE and the NAVFAC Southeast FPE shall witness final acceptance tests for all systems installed for Sections D40 and D5030.

The DBFPE is responsible for developing the hydraulic analysis, and developing a code analysis demonstrating compliance with all NFPA codes and the model building code utilized prior to initial design submittals.

The DBFPE is expected to verify provision and construction compliance of all passive fire protection systems in the facility (proper wall, floor, and ceiling rating; proper use of fireproofing and fire-stopping systems; protection of openings; coordination of door ratings, hardware, etc.).

The DBFPE shall identify any special hazards in the facility (i.e., chemical use/storage, HAZMAT, flammable use/storage, etc.) and verify adequate protection (i.e., fire rated construction, explosion venting, alternate suppression, etc.) is provided.

D4010 SPRINKLERS

D401001 Sprinklers and Releasing Devices

A. Provide wet pipe automatic sprinkler protection to provide complete coverage throughout Operations Building and Boat Maintenance Building. System shall be designed in strict accordance with the required and advisory portions of NFPA 13. A dedicated floor control valve assembly consisting of a supervised control valve, check valve, and water flow switch shall supply each floor.

B. Provide dry pipe automatic sprinkler protection to provide complete coverage throughout Boat Storage Building.

C. Seismic requirements for sprinkler systems shall follow the acceleration criteria found in IBC.

D. Design criteria shall be determined by establishing occupancy classifications per UFC 3-600-01. Boat Storage and Maintenance Buildings shall be ordinary hazard Group 2.

D401002 Sprinkler Water Supply Equipment and Piping

A. A potential point of water connection for fire protection is indicated on drawings included as an attachment in Part 6 of the RFP.

B. Water supply information is also provided in Part 6. Water supply given in the RFP shall be the values used by the DBFPE when completing the hydraulic analysis and calculations. The design point of connection to existing water supply shall require the approval of the Contracting Officer.

C. Design criteria shall be determined by establishing occupancy classifications per UFC 3-600-01.

D. Provide a double check type backflow preventer with indicating type valves in the base of the sprinkler riser in a mechanical or accessible interior space.

D4030 FIRE PROTECTION SPECIALTIES

D403001 Fire Extinguishing Devices

A. Provide portable fire extinguishers in accordance with NFPA 10 and NFPA 101 mounted in a secure manner. Recessed fire extinguisher cabinets shall be provided for all extinguishers in finished areas. Cabinets shall have glass or lexan fronts and shall be non-locking.

D5030 COMMUNICATIONS AND SECURITY

D503001 Fire Alarm Systems

A. Provide a complete, electrically supervised, addressable intelligent, manual and automatic, annunciated fire alarm and detection system throughout the facility.

B. Fire alarm system shall include manual stations, system smoke detectors, duct smoke detectors, heat detectors, audio/visual alarms, fire alarm radio transmitter, and electrical supervision of all sprinkler system alarm and supervisory devices.

C. The fire alarm system main panel must be fully compatible, and equipped with integral FireFinder network interface for data communications, with Siemens FireFinder Network Command and Control (NCC) central station system.

D. The Station fire alarm radio transmission system is Monaco. The receiving control console is located in Building 2101, Communications Room. Provide minimum 16 zones radio transmitter panel as manufactured by Monaco for transmitting signals to the Station's Fire Station. The Base is currently in the process of replacing the radio fire alarm transmission with underground fiber optic cable and Siemens Apogee Workstation. The fire alarm system shall be compatible with Siemens Apogee Workstation.

E. The fire alarm manufacturer shall have been engaged in the production of this type of equipment for at least ten years and have fully equipped 24/7 customer response center capable of responding within 4 hours of initial contact, emergency and on/off business hours.

F. The fire alarm control panel and pull stations shall be keyed alike in accordance with the Station's standards.

G. Provide a minimum of 60 hours of battery back-up for the fire alarm control panel.

H. Interface the Notification Appliance Network with the Mass Notification System.

I. Provide a remote annunciator panel, location to be determined by the Station's Fire Chief. Provide a microphone station adjacent to the annunciator panel.

J. As a minimum, there shall be a manual pull station in each man door exit to the exterior of the building.

K. As a minimum, smoke detectors shall be provided in Electrical, Mechanical, Communications, TOC, and rooms as directed by the Station's Fire Chief.

L. Heat detectors shall have removable heads.

M. Duct detectors located above acoustical ceiling tiles shall be provided with wall mounted remote test switch and indicator lights with nameplate.

N. Knox-box unit shall match current Station standard and be equipped with a tamper switch. The Designer of Record shall coordinate the location for the Knox-Box unit with the Station Fire Department during the design phase.

O. Interlock air handling equipment with the fire alarm system such that air handling equipment is shut-down upon activation of the fire alarm system audible/visual alarms. Air handling equipment shall include, but shall not necessarily be limited to HVAC equipment and ventilation fans.

P. See Part 4 of D40 for additional requirements.

Q. Refer to SSC Facility Electrical Standard (SSTD-8070-0081-ELEC) in Part 6 of the RFP for additional electrical requirements. If conflict arises between SSTD-8070-0081-ELEC and the RFP, stricter requirements shall take precedence.

D50 ELECTRICAL

Refer to Part 4 Section D50 for performance requirements of the building elements included in the electrical systems.

SYSTEM DESCRIPTION

Provide an interior electrical system including all accessories and devices as necessary and required for a complete and usable system. This section covers installations out to the building 5-foot line.

GENERAL SYSTEM REQUIREMENTS

Provide an Electrical System complete in place, tested and approved, as specified throughout this RFP, as needed for a complete, usable and proper installation. All equipment shall be installed per the criteria of RFP Part 4 Section D50 and the manufacturer's recommendations. Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall."

Refer to SSC Facility Electrical Standard (SSTD-8070-0081-ELEC) in Part 6 of the RFP for additional electrical requirements. If conflict arises between SSTD-8070-0081-ELEC and the RFP, stricter requirements shall take precedence.

The second floor shall be constructed as a Controlled Access Area (CAA). All requirements associated with a CAA shall be provided in accordance with Information Assurance Publication 5239-22 (IA PUB-5239-22, 2003), MIL-HDBK-1013/1A (1993), OPNAVINST 5530.14C.

All secure room areas shall be provided in accordance with SECNAVINST M-5510.36 (2006).

An office space is defined as an assigned occupied space with solid partition walls.

Common spaces are defined as spaces either larger than 200SF or a space occupied by more than 4 personnel.

For the wash rack area, provide lighting and power in accordance with existing wash rack design included in Part 6 of the RFP.

For the helipad area, provide lighting and static grounding in accordance with UFC 3-535-01, "Visual Air Navigation Facilities".

For the Armory, provide electrical and communications design in accordance with OPNAVINST 5530.13C "Department of the Navy Physical Security Instruction for Conventional Arms, Ammunition, and Explosives Storage (AA&E)" and DoD 5100.76-M, Department of Defense Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives".

GOVERNMENT FURNISHED EQUIPMENT

Provide electrical connection to Government furnished equipment as described in Section E10.

D5010 ELECTRICAL SERVICE AND DISTRIBUTION

D501001 Main Transformers

A. Main transformer is defined in Section G40 "Site Electrical Utilities."

D501002 Secondary

A. All service into the facility shall be underground. Provide an interior distribution system consisting of insulated conductors in conduit. Provide connections for all equipment, plumbing systems, air conditioning and ventilation systems, fire alarm systems, security systems, CCTV system, CATV system, telecommunications systems, generator system, equipment provided by other trades, etc.

D501003 Service Entrance Equipment

A. Provide a switchboard or panelboard with main circuit breaker as service equipment. Provide a switchboard or panelboard with digital metering and transient voltage surge suppression (TVSS). Digital metering shall include provisions for the display of amperes, and L-L, and L-N volts, for each phase. Main switchboard or panelboard shall have the capability in connecting to the building energy management control system (EMCS). This project will not require connections to the EMCS.

D501004 Interior Distribution Transformers

A. Provide dry-type transformers to step down secondary voltages for general purpose outlets and other low voltage equipment. Provide copper windings. Provide 20% spare capacity for future use. Temperature rise shall be 80 degrees C. Insulation shall be 220 degree C class.

D501005 Panels

A. Provide distribution and branch circuit panelboards with bolt-on type breakers and copper buses throughout to serve loads as required.

B. For multi-pole breakers, provide common trip type with single handle.

C. Provide hinged panelboard trim front construction with breaker door hinged and secured with keyed handle, and main cover hinged on one side and secured with screws on the other.

D. Provide 20% growth capacity in each panelboard for future loads in addition to loads identified during design. Provide 25% of the growth capacity provided above for single pole breaker spaces in each panelboard in addition to loads identified during design.

E. Panelboards for electronics and computer loads shall be fed from dedicated panelboards with an isolated ground system in accordance with SSTD-8070-0081-Elec.

F. Provide a 100A MCB, 120/208V, 3 Phase, 4 Wire, 42 poles panelboard with minimum 16 – 20A/1P, 4 – 30A/2P branch circuit breakers for the Main Communications Room. Panelboard(s) is dedicated for data and voice equipment for the Communications Room. Convenience outlets in Communications Room shall not be fed from this panelboard. Assume 60% demand load for calculations.

G. Provide a 100A MCB, 120/208V, 3 Phase, 4 Wire, 42 poles panelboard with minimum 16 – 20A/1P, 4 – 30A/2P branch circuit breakers for the TOC Communications Room. Panelboard(s) is dedicated for data and voice equipment for the Communications Room. Convenience outlets in Communications Room shall not be fed from this panelboard. Assume 60% demand load for calculations.

H. Provide dedicated panelboards for the Boat Maintenance Building, Boat Storage Building, Wash Rack, and Helipad areas.

D501006 Enclosed Circuit Breakers

A. Provide enclosed circuit breakers as required.

B. For multi-pole breakers, provide common trip type with single handle.

D501007 Motor Control Centers

A. Provide motor control centers, individual motor starters with disconnect switches, combination motor starters, variable speed drives, reduced voltage controllers, and manual motor starters for motor controls as required by mechanical equipment.

B. Each motor starter unit shall be equipped with push-to-test LED type “Power Available” and “Motor Running” pilot lights, hand-off-auto selector switches, and control power transformers.

C. Provide all feeders and branch circuits, and associated connections for motors.

D. Provide circuit breakers for motor overcurrent and short circuit protection. Minimize the use of fuses.

E. Provide a minimum of 25% space and rating capacity for future use.

D5020 LIGHTING AND BRANCH WIRING

A. Provide lighting and general purpose receptacles throughout all spaces as required.

B. Minimum conduit size shall be 3/4.”

C. Provide a green color equipment grounding conductor in all raceways.

D. All circuiting including homeruns shall be shown on the design drawings exactly as they are to be installed. Homeruns shall contain no more than 3 phase conductors.

E. Provide dedicated power connections, 20A, 120V, to all ancillary office equipment such as printers, faxes, plotters, shredders, vending machines, ice machines, microwaves, and other equipment as indicated in the RFP.

F. Provide power and controls for all electrical equipment such as roll-up doors, air compressor, etc., coordinate with other trades.

D502001 Branch Wiring

A. All branch wiring shall be insulated conductors in conduit. All circuiting including homeruns shall be shown on the drawings exactly as they are to be installed. Homeruns shall contain no more than 3 phase conductors.

B. Minimum conduit size shall be 3/4".

C. All conductors including HVAC controls wiring shall be installed in minimum 3/4" conduit.

D. All general purpose receptacle cover plates shall be stainless steel to match Station's standards.

E. As a minimum, provide the following for each computer workstation outlets:

1. One quadruplex receptacle for each computer workstation and one quadruplex receptacle preferably on opposite walls for future flexibility of relocating systems furniture.

F. As a minimum, provide the following for each office space or common areas:

1. In addition to the computer workstation(s) listed above, there shall also be convenience duplex receptacles spacing at maximum 8'-0" apart. The quadruplex receptacle used for the computer workstations can be included to comply with this requirement.

G. As a minimum, provide the following for the Mission Briefing Rooms:

1. Wall mounted duplex receptacles spaced at maximum 10'-0" apart.

2. Provide a floor outlet box for Government furnished Government installed furnishing at two locations. Each floor box shall contain: 1 Quad Receptacle, a NIPRNet outlet, a SIPRNet outlet with metallic barriers between each system. Observed minimum separation for the SIPRNet outlet. The SIPRNet outlet shall have a locking top plate. Metal floor box shall be a minimum of 2-1/8" deep with a slanted interior to conceal plugs while plate is closed. Top plate shall have a carpet insert and wire channel. Coordinate with end users for exact locations of floor boxes.

3. A ceiling mounted duplex receptacle for projector.

H. As a minimum, provide the following for each counter:

1. Duplex receptacles spaced at maximum 3'-6" apart.

I. As a minimum, provide the following for systems furniture (cubicles):

1. Wall mounted junction boxes or power poles for flexible connections of power wirings to systems furniture.

2. Provide two duplex receptacles for each cubicle.

3. Provide a maximum of two cubicles per 20A, 120V, branch circuit.

4. Wall mounted junction boxes and power poles shall be located such that Users can relocate systems furniture in the future within an 8 foot radius from its original location without splicing conductors for extension. Therefore, provide sufficient slack conductors to comply with this requirement.

5. There shall be wall mounted junction boxes or power poles available for connections to systems furniture in each group of cubicles.

6. Coordinate with Government and Users during the design for final systems furniture layout and exact location of wall mounted junction boxes and power poles.

7. For bidding purposes, assume systems furniture will be pre-wired with a 10-wire system. During design, coordinate with pre-manufactured systems furniture actually selected as required by Section E20, "Furnishings."

J. As a minimum, provide the following for each restroom:

   1. A minimum of one ground fault circuit interrupter (GFCI) receptacle for each restroom.

K. As a minimum, provide the following for the Main Communications Room:

   1. Duplex receptacles at maximum spacing of 4'-0" apart at 18" above finished floor.

   2. Provide two dedicated, 20A, 120V branch circuit for each communications relay racks.

L. All useable walls wider than 2'-0" except corridors, vestibules, stairways, and restrooms shall be provided with duplex receptacles spaced at maximum 10'-0" apart.

M. Provide duplex receptacles at maximum spacing of 30'-0" on center for corridors. Provide dedicated branch circuit for corridor receptacles.

N. Provide a duplex receptacle adjacent to each CATV outlet.

O. Provide weatherproof and ground fault circuit interrupter duplex receptacles around exterior perimeter of the building with maximum spacing of 50'-0" on center.

P. Provide a maximum of five duplex receptacles per 20A, 120V branch circuit or a dedicated 20A, 120V branch circuit for each office up to 100 square feet. Provide two individual 20A, 120V branch circuits for each office over 100 square feet.

Q. Provide a dedicated 20A, 120V branch circuit for each security system control panel, intrusion detection control panel, CCTV system, fire alarm control panel, and ECMS.

R. Electrical systems shall be designed such that Users can reconfigure systems furniture or demountable partitions without adding branch circuit conductors or conduit.

S. Provide a dedicated 20A, 120V branch circuit with a WP and GFCI duplex receptacle for portable tools on top of the roof, nearby Users' antennas.

T. There shall be a dedicated 20A, 120V branch circuit with a WP and GFCI duplex receptacle nearby each outdoor equipment such as lift station, portable generator, mechanical equipment, or any outdoor electrically operated equipment.

U. Provide a dedicated 20A, 120V branch circuit for each shredder. Assume there will be one shredder on the first floor and three shredders on the second floor.

V. Provide power and connections for motor operated overhead coiling door, electric water coolers, air compressor, mechanical and plumbing equipment, gate operators, etc. Coordinate with other trades for equipment that requires power and connections.

W. In addition to the above requirements, for the Boat Maintenance Building, provide power requirements as follows:

   1. Duplex receptacles spaced at maximum 10'-0" apart on all interior walls with minimum one duplex receptacle per wall larger than 2'-0" wide.

   2. Provide a dedicated 20A, 120V branch circuit with a duplex receptacle for battery charger at two locations. Coordinate with Users for exact locations.

   3. Mount all receptacles at 48" above finished floor.

   4. Provide one retractable reel for each bay. Retractable reel shall be similar to Reelcraft Series 4000 & 5000, durable abrasion and corrosion resistant baked on power coat finish, enclosed drive spring, spring retractable reel with latch heavy gauge steel frame, adjustable bumper stop, adjustable guide arm, metal outlet box with one 20 amp duplex receptacle and ground fault circuit interrupter protection with flip top lid, minimum 35 foot cord or cord length as required for reaching the receptacle at 4'-0" above finished floor,

grounding conductor, universal mounting and all necessary components for complete installations.

5. Provide a 4 – 20 amp, 240V, single phase, plus ground special receptacle for User's equipment. Provide dry-type transformer rated at 120/240V secondary for the loads specified. Assume a 15KVA transformer will be required. Coordinate with Users for exact locations.

X. In addition to the above requirements, for the Boat Storage Building, provide power requirements as follows:

1. GFI & WP duplex receptacles spaced at maximum 12'-0" apart on all interior walls with a minimum of one duplex receptacle per bay toward the back of the building.

2. One GFI & WP duplex receptacle at each column of each bay toward the front of the building.

3. Mount all receptacles at 48" above finished floor.

Y. For the wash rack area, provide power in accordance with existing wash rack design included in Part 6 of the RFP.

Z. For the helipad area, provide static grounding in accordance with UFC 3-535-01.

AA. Provide power and controls for the lift station as described in G302003.

BB. Provide a duplex receptacle inside each cage in the cage area.

CC. Provide power and controls for the 2-ton crane.

DD. For each flat panel location, provide a duplex receptacle. Assume there will be 2 flat panels in each Mission Briefing Rooms, Task Unit Commander Office, and Training Office.

EE. Provide power and controls for the vehicle gate.

D502002 Lighting Equipment

A. Provide a complete lighting system consisting of exit, emergency lighting, interior and exterior building perimeter lighting fixtures.

B. Lighting system shall consist of fluorescent and high intensity discharge lighting including switches, automatic lighting controls, occupancy sensors, and dimming systems.

C. All general lighting fixtures shall be of the acrylic lens type, minimum 3" deep, T8 lamps, electronic ballasts, EMI/RFI filters, paint after fabrication, fast blow fuse, for all finished spaces where acoustical ceiling tiles are available. Lighting fixtures for the remaining spaces shall be as selected by Designer of Record or as indicated in other sections of the RFP.

D. Provide steel wires at each corner of each lighting fixture and independently supported to building structure.

E. In addition to the 2x4 lighting fixtures, provide compact fluorescent down lights with decora sliding dimming controls and override on/off toggle switch for the Mission Briefing Room and the River OPS Control Watch Station Room. Lighting level shall be designed around 30 average maintained footcandles measured at desk height.

F. Provide ultrasonic sensors for restroom and wall mounted occupancy sensors for individual office spaces. Provide automatic lighting controls for all other areas except in electrical, mechanical, communications, and areas where as determined by Designer of Record. Override switches shall be located at each entry point to each area.

G. Refer to Section G40, "Site Electrical Utilities," for automatic lighting controls for exterior building perimeter lighting.

H. All toggle switch cover plates shall be stainless steel to match Station's standards.

I. Provide a minimum of 30 – 40 average footcandles for electrical and mechanical rooms with local toggle switch controls.

J. Provide a minimum of 45 – 55 average footcandles for the Main Armory and the Gun & NVG Lockers Rooms.

K. Provide lighting with local controls for all mechanical equipment areas.

L. Provide sufficient illumination for CCTV cameras as required for exterior of the building.

M. For one of the Mission Briefing Rooms, provide lighting for video teleconferencing capability.

N. In addition to the above requirements, for the Boat Maintenance Building, provide lighting as follows:

1. Interior fluorescent lighting fixtures with T8 lamps.

2. Exterior building perimeter security lighting fixtures with lighting controls as indicated in G40 of the RFP and SSC Facility Electrical Standard in Part 6 of this RFP. Provide high pressure sodium lamps for exterior as requested by End Users.

3. Local toggle switches controlling the lighting fixtures for each bay or area. 3-way and 4-way switches as required.

O. For the Boat Storage Building, provide lighting as follows:

1. Interior fluorescent lighting fixtures with T8 lamps.

2. Exterior building perimeter security lighting fixtures with lighting controls as indicated in G40 of the RFP.

3. Weatherproof Local toggle switches controlling the lighting fixtures for each bay.

P. For the wash rack area, provide lighting in accordance with existing wash rack design included in Part 6 of the RFP.

Q. For the helipad area, provide lighting in accordance with UFC 3-535-01. Provide a 1x4 strip fluorescent lighting fixture with wire guard inside cage for the cage area. Provide local toggle switch controls for each fixture. Controls shall also be on the building automatic lighting control system.

D5030 COMMUNICATIONS AND SECURITY

D503001 Fire Alarm Systems

A. Refer to Sections D40, “Fire Protection,” and G40, “Site Electrical Utilities,” for additional requirements.

D503003 Telecommunications Systems

A. Provide a complete building backbone and horizontal distribution system in a star topology including, but not necessarily limited to, all wiring, pathway systems, grounding, backboards, connector blocks, protectors for all copper service entrance pairs, fiber and copper patch panels, terminators for all fiber optic cables, outlet boxes, telephone jacks, data jacks, cover plates and communications relay racks.

B. Provide printer outlets (to support both NIPRNet and SIPRNet), fax outlets, copy machine outlets, computer workstation outlets for non-classified network (NIPRNet outlets), and computer workstation outlets for classified network (SIPRNet outlets) as indicated in the “Room Requirements.” Provide five additional NIPRNet and five additional SIPRNet outlets, conduit, and wiring at locations to be determined by Users during design. Provide required separation between NIPRNet and SIPRNet facilities in accordance with Tempest 2-95.

C. A printer outlet for non-classified network (NIPRNet printer outlet) shall consist of two Category 5e, RJ-45, 8-position data jacks with Category 5e unshielded twisted pair (UTP) copper cables in 3/4” conduit when concealed in wall, via cable trays when in plenum space.

D. A printer outlet for classified network (SIPRNet printer outlet) shall consist of two Category 5e, RJ-45, 8-position data jacks with Category 5e unshielded twisted pair (UTP) copper cables in 3/4” conduit when concealed in wall, via cable trays when in plenum space.

E. A fax outlet shall consist of two Category 5e, RJ-45, 8-position data jacks with Category 5e unshielded twisted pair (UTP) copper cables in 3/4" conduit when concealed in wall, via cable trays when in plenum space.

F. A copy machine outlet shall consist of two Category 5e, RJ-45, 8-position data jacks with Category 5e unshielded twisted pair (UTP) copper cables in 3/4" conduit when concealed in wall, via cable trays when in plenum space.

G. A NIPRNet outlet shall consist of two Category 5e, RJ-45, 8-position data jacks and two Category 5e, RJ-45, 8-position voice jacks with Category 5e unshielded twisted pair (UTP) copper cables in 1" conduit when concealed in wall, via cable trays when in plenum space.

H. A SIPRNet outlet shall consist of two Category 5e, RJ-45, 8-position data jacks with Category 5e shielded twisted pair (STP) copper cables in 1" conduit.

I. A video teleconferencing (VTC) outlet shall consist of three Category 5e, RJ-45, 8-position data jacks and one Category 5e RJ-45, 8-position voice jack with Category 5e UTP copper cables in 1" conduit.

J. Provide three additional NIPRNet printer outlets, three additional SIPRNet printer outlets, three additional fax outlets, and three additional copy machine outlets where requested by Users or Government during the design phase.

K. As a minimum, provide the following for the Mission Briefing Rooms:

1. Refer to Section D502001 "Branch Wiring" for floor outlet box requirements.

2. A ceiling mounted NIPRNet outlets (without the voice jacks) for projector.

3. Provide 2 - 1 1/4" conduit with a floor mounted junction box to the projector location for data cabling.

4. A VTC outlet (only in the Mission Briefing Rooms).

L. Provide one communications relay rack for non-classified electronic switches and one communications cabinet for classified electronic switches for the TOC Communications Room on the second floor.

M. Allocate two future communications relay rack spaces for the TOC Communication Room on the second floor.

N. Each communications relay rack and cabinet shall be 19" wide and consist of Category 5e copper and fiber optic patch panels as required, adjustable self-mounting rails, pilot-point combo head screws, power strips with six, 20A, NEMA Type 5-20R configuration receptacles surge protector, grounding bar, horizontal and vertical management, and all necessary components for complete installations.

O. Provide as many 110 punch down blocks and patch panels as required for complete communications installations.

P. Voice cables shall be terminated with 110 punch down blocks for wall mounted installations.

Q. Colors for jacks and wiring shall match existing horizontal wiring installed in Building 2603. Therefore, provide "red" color for classified data jacks and wiring. Provide "blue" color for non-classified data jack and wiring. Provide "beige" color for voice jacks and "white" color for voice wiring. Terminate all data and voice jacks in accordance with TIA/EIA/568-A configuration.

R. Fiber optic cables shall be terminated in "SC" type connectors.

S. Provide minimum 12" wide x 6" deep or larger size as required per National Electrical Code for conductor fills in cable trays, center spline, aluminum ladder type) throughout the facility. Cable trays shall have smooth transitions to communications relay racks and punch down blocks. Cable trays shall be accessible and located in such a manner that they will not disturb the occupancy or require relocating of furniture or equipment during routine maintenance. Locate cable trays in Corridors as much as possible. There shall be sufficient cable trays directly above each communications relay racks and cabinets and punch down block areas. Provide two sets of cable trays, one for voice/NIPRNet wiring and one for SIPRNet wiring.

T. Provide cable trays around the perimeter walls and in the middle of the TOC/Briefing Room and TOC Communications Room.

U. Provide 3 – 2" empty conduit between TOC Communications Room & Mission Briefing Room.

V. Provide 4 – 4" empty conduit with pull rope to roof for Users' antenna on roof. Coordinate with Users for exact locations of conduit terminations. Conduit shall originate in the TOC Communications Room. Provide a standalone weatherproof telephone set and telephone line at the vehicle gate.

W. Provide insulated bushing at each end of each conduit.

X. Provide a pull box where more than 2 – 90 degrees bends is required.

Y. Although NMCI will not be involved with the telecommunications system for this building, Designer of Record shall provide and follow all applicable requirements listed in UFC 3-580-10 for design guidance.

Z. Provide a standalone weatherproof telephone set and telephone line at the vehicle gate.

D503004 Public Address Systems

A. Provide a complete public address system consisting of speakers in common spaces, and all necessary components for a complete system. Paging shall be accomplished through the telephone sets. Loud speakers shall be provided throughout the facility and outside activity spaces including the Boat Storage and Maintenance Buildings.

B. Public address amplifier shall be Bogen Communications System, Model "HTA-250A" to match existing public address system located at Building 2603.

C. Interface the new public address system with existing PA system in building 2603. Provide cable in ductbank system as describe in Part 3, G40 of the RFP. Provide zone paging module in Building 2606 as required for interface.

D. Interface the Public Address System with the Mass Notification System.

D503005 Intercommunications Systems

A. Provide a complete intercom station as follows: Intercom station shall consist of a master station and sub stations, selective output relay, power supply, control cables, conduits, and all necessary components for complete installations. Provide master station similar to Aiphone "NDR-10A," and sub-stations similar to Aiphone "NE-JA". The master station shall be located in the TOC Room. Provide substations at the following locations: Communications Room, Mission Briefing Rooms, Squadron Interoperability Task Unit Office, River OPS Control Watch Station, Boat Maintenance Building (2 locations), plus 3 other locations to be determined by End Users during the design phase.

D503007 Television Systems

A. Provide a complete CATV system to be owned and maintained by the Government including all interior equipment required to provide high quality TV signals to all outlets with a return path for interactive television and cable modem access. System shall include, but not necessarily limited to, headend amplifier, amplifiers, splitters, combiners, line taps, cables, outlets, tilt compensators and all other parts, components, and equipment necessary to provide a complete and usable system.

B. Provide RG6 coaxial cable with "F" connector in 3/4" conduit from each CATV outlet to CATV cabinet.

C. Provide CATV outlets at locations as indicated in the "Room Requirements." Provide five additional outlets, conduit, and coaxial cables at locations to be determined by Users during design.

D503008 Security Systems

A. Provide a fully operational interior and/or exterior integrated electronic security system (ESS) complete and ready for operation. ESS systems shall consist of an automated access control system (AACS), a closed circuit television (CCTV) system for surveillance, data transmission media (DTM), and an intrusion detection system (IDS).

B. All components of the ESS shall be of the same form, function, and use as the existing ESS throughout the Station.

C. Provide a fully operational automated access control system. The AACS primary function shall be to regulate access through specific doors to secured areas of the facility. It shall also have the provision of capturing cardholder images and producing access cards used to provide this access. The system shall use a single seamlessly integrated database for both its access control and badging functionality. This integration shall be provided under one operating environment. The system shall provide a multi-tasking environment that allows Users to run several applications simultaneously. The system shall be of server/client architecture. All system application modules, features, and functions shall be generated from a single source code set. In addition, the source code must be designed using object-oriented software development techniques and compiled into native 32-bit applications. There shall not be separate source code bases for access control and ID badging. Provide AACS as follows:

1. Provide proximity readers, outlet boxes, conduit, cables, controllers, etc., for each entry door, and doors into the armory, plus four (4) other doors to be determined by User during the design phase.

2. Intelligent system controllers consists of distributed intelligence, Ethernet communications, dial-up capabilities, redundant communications, backup battery, internal memory, local alarm input and output, LED diagnostics, and single reader interface module. The system shall employ a distributed architecture so that all access decisions are made locally at the intelligent system controller to provide fast decisions. All intelligent system controllers shall operate in a stand-alone mode in the event that network communications are lost. It shall continue to make access granted/denied decisions and maintain a log in local memory until such time that communications are restored. Decision log information will be uploaded at that time.

3. TCP/IP communications techniques over Ethernet, while employing proprietary communications protocols.

4. Man machine interface (MMI) consists of on-line help, navigation, toolbar customization, languages, and installation.

5. System operators consist of authentication, partitioning, privilege levels, operator profiles, operator journal, and workstation auto-lock.

6. Cardholders consist of cardholder data, searching, cardholder images, card trace, grouping cardholders, cardholder violations, and cardholder data import/export. The cardholder management shall be integrated with the AACS. The system must support at least 1,000,000 cards – all of which are downloaded and maintained in each intelligent system controller. The system shall allow the capture of a high quality image of the cardholder from any workstation computer on the system network. Provide 500 proximity cards.

7. Assignment of access to an infinite number of combinations of access permissions to be assigned to any cardholder programmed in the system.

8. 65,000 configurable time schedules to include or exclude holidays to be defined by Users.

9. Card readers and cards with Siemen supported cards and technologies.

10. Host event processing for immediate propagation, local event buffer, and database accessibility.

11. Real time audit trail for partitioned display data, operator audit trail profile, event short-cuts, dual window, and real-time audit trail printing.

12. Advanced alarm management for alarm annunciation, visual alarm graphics, multi-media alarming, alarm re-activation, alarm queue, and alarm configuration.

13. Printers consist of dedicated printers by function, reports, real time printing, ID card printing, and plan printing.

14. Archiving system consists of archiving medium and User definable archiving parameters.

15. Reporting consists of design custom audit trail reports, save and open queries and sorting, print to reports printer, and database reports.

16. Scheduling for holidays, public floor access, access per door, by specific date and time, and by certain events.

17. Anti-passback consists of soft Anti-passback, hard Anti-passback, peer-to-peer Anti-passback, mustering area, and area limits.

18. Control and monitor points consist of monitor point parameters and control point parameters.

19. Event routines consist of event triggers, event actions, host events, and ISC events.

20. Grouping of the same type for the purposes of controlling those components as a single entity.

21. System status indicates the current status of system components.

22. System overview to display a full architecture of the access control and security network in a Windows explorer type view.

23. CCTV high level interface to support a range of matrix switchers (Siemens SIMATRIX, Pelco 9760/9740, Pelco CM6800, Pelco CM 6700, Pacom 2030), cameras controls, view live video input, CCTV configurations, switching in response to certain events, CCTV MMI, CCTV macros, and video loss.

24. Digital video recorder management to support a range of DVR unit types as manufactured by Kodicom, Dedicated Micros, & Siemens, camera controls, view live video input, DVR configuration, switching in response to certain events, DVR MMI, and DVR playback.

25. The Security Contractor shall be regularly engaged in the manufacturing, installation, and maintenance of AACS systems and shall have a minimum of ten years of demonstrated technical expertise and experience in the manufacture, installation and maintenance of AACS systems similar in size and complexity to this project. The Security Contractor shall work with SBT-22 Asst. Security Manager, Chief Master at Arms for all security system requirements.

26. The “Security System Contractor” shall work with the Government to develop and configure the system.

27. The AACS requirements listed above is based on Siemens products. Siemens has an IDIQ service contract with Stennis Space Center for site wide maintenance and construction of the security system.

D. Provide a fully operational interior and/or exterior CCTV system. There shall be sufficient quantity for full coverage of fixed and full coverage of pan/tilt/zoom cameras throughout the facilities. Provide fixed CCTV cameras for indoor locations. Provide pan/tilt/zoom CCTV cameras for outdoor locations except that fixed CCTV camera(s) shall be provided to monitor the vehicle gate to the site. Monitoring of the CCTV system will be located at the POOW/Quarterdeck watch locks in Building 2603. Provide CCTV system as follows:

    1. Provide full CCTV cameras coverage for all entry/exit doors around the exterior perimeter of the building, all doors into secure rooms, doors into each weapons storage room, and each weapons storage room, plus four (4) other locations to be determined by User during design phase.

    2. Provide full coverage for the exterior perimeter of the building, exterior weapons cleaning pavilions, the site between the building and the perimeter security fence, the perimeter security fence, from ground level up to the top of the fence, and each gated entrance to the site.

    3. CCTV Day/Night Cameras shall use wide dynamic range technology, providing up to 60 dB of dynamic range and produce superior images over a wide range of lighting conditions, including extreme backlit conditions. The camera must also use a removable infrared cut filter to switch between color and black & white modes as environmental lighting conditions change. It must also provide a dual resolution of 530 TVL (BW) and 480 TVL (color). The cameras shall be capable of use with fixed, manual, or DC drive auto iris lenses.

The auto iris shall be controlled through a standard four-pin square connector that is included.

4. Black Box & Lower Dome shall be a pressurized dome camera including an environmental pendant style black box and a lower dome for optical clarity. The dome shall be pressurized with dry nitrogen to 8 psig to stabilize the interior environment. Sensor shall be included to send an alert message upon changes in internal pressure, temperature, or dew points that are beyond factory set acceptable limits. The sensors shall allow for on-screen display of internal temperature, pressure, and dew point. The back box shall contain a sun shroud, heater and fan to maintain a consistent operating environment.

5. Outdoor Camera Enclosures shall be made of die cast and extruded aluminum construction. Provide heater, defroster, sun shroud, and blower options. In areas of low light, provide an infrared illuminator with the camera for sensitivity in the IR spectrum. Automatic on/off operations for the illuminator shall be controlled by a photocell with time delay feature to prevent the unit from being switched off by a momentary beam of light.

6. Digital Video Recording/Archiving: the video management system (VMS) shall support state of the art video storage, alarm and event management, and real time monitoring capabilities. The VMS shall be IP based and run on dedicated server/client architecture to support a flexible and scalable backbone. The system shall be comprised of all necessary Ethernet infrastructures to support wireless transmissions, voice transmissions, alarm inputs, relay contacts, compressed video in MPEG 4 format at 4 CIF, and 32 frames per second resolution. The VMS shall support a storage rate of 32 frames per second for all cameras and store the compressed data for 24 hours a day, 30 days at a time. Provide all hardware storage in a RAID configuration for automatic redundancy in case of storage medium failure. The VMS shall also support multi-cast technology to support storage at secondary server locations. In case of a failure at the primary storage location, the system shall automatically swap over to the secondary storage server. Once the primary server is back on line, the system shall automatically refresh the data from the secondary server to the primary server. The VMS shall support the simultaneous display of 32 cameras via graphical display walls. Drag and drop control shall be used to eliminate the need for matrix switchers and keyboards. The VMS must incorporate Video Detection and Tracking software to analyze the video images for baggage detection, vehicle detection, intrusion and motion detection, people counting, and line control. The VMS shall intelligently analyze the video for threats based on height, speed, and other motion parameters.

7. The system main graphical display wall shall be located in the Division office, with separate monitors in each weapons storage area. The separate monitors shall each receive their video image(s) from the CCTV cameras on the main gated personnel entrance to the site.

E. Provide a fully operational interior basic Intrusion Detection System (IDS). System shall provide sensors to detect penetration of the facility perimeter and protected zones by unauthorized personnel or intruders. Communications linking the various IDS subsystems and to the central reporting location shall be via hardwire (copper cable). Provide IDS in accordance with DCID 6/9. Provide IDS as follows:

1. IDS shall sense all perimeter doors and windows, armory, doors, and Knox-Box unit tamper switch, plus four (4) other doors to be determined by User during design phase.

2. System shall have entry/exit timer, glass break sensors, and motion detectors, etc. for a complete and operation system.

3. The glass break sensors used to detect glass breakage shall process sound data in parallel rather than sequentially for faster and more accurate detection decisions. The sensors shall have selectable sensitivity to match the acoustics of the given space and can be verified remotely. All glass types including plate, tempered, laminated, wired, film-coated and sealed insulating shall be detectable. The sensor shall perform multiple domain signal analysis in which time, frequency and amplitude characteristics are evaluated for signal qualification and eliminate false alarms.

4. As a minimum, provide separate zones for administrative/office areas and non-administrative/non-office areas plus five (5) spare zones to be determined by Users.

5. Provide two IDS override keypads, locations to be determined by Users.

D503099 Other Communications and Alarm Systems

A. Provide an Individual Inhabited Facility/Building Subsystem type Mass Notification System (MNS).

D5090 OTHER ELECTRICAL SERVICES

D509001 General Construction Items (Electrical)

A. Provide General Construction Items (Electrical) including, but not necessarily limited to, all connections, fittings, boxes and associated equipment needed by this and other sections of this RFP as required for a complete and usable system.

D509002 Emergency Lighting and Power

A. Provide emergency lighting as follows:

1. Provide power and wiring for emergency lights and exit signs throughout the facility.

2. Provide LED lamps for exit signs with nickel cadmium battery back-up.

3. Emergency lighting shall be able to perform an automatic test for not less than 30 seconds and a diagnostic routine not less than once very 30 days. Failures shall be indicated through a status indicator. Continuous status of that test shall be held in the unit until the next test cycle.

B. Provide emergency generator system as follows:

1. A diesel emergency generator (outdoor type) and automatic transfer switch(es) (ATS) with by-pass isolation switch. The Contractor shall be responsible for all generator permitting. SBT-22 will be responsible for the Operating Permit.

2. The generator shall support all electrical loads for this project.

3. The generator manufacturer shall have been engaged in the production of this type of equipment for at least ten years and have a fully equipped service organization capable of responding within 4 hours of initial contact, emergency and on/off business hours, 7 days a week, 24 hours per day.

4. Generator shall have alternator heater, NFPA 110 controller, generator line circuit breaker with shunt trip, emergency stop push-button station, block heater, generator strip heater, battery, battery charger (equalize/float type), electronic governors, critical exhaust silencer muffler, UL feasible braided fuel lines, battery rack and cables, air cleaner, air cleaner restriction indicator, certified factory test, maintenance kit to include 1 set of spare filters, water and air filters, all stainless steel fittings and connectors, 3 sets of operation and maintenance manuals, remote annunciator panel, remote emergency stop kit, engine pre-alarm sender kit, and all necessary components for a complete system.

5. Provide stainless steel for insulate exhaust silencer, piping, and flexible connections. Install exhaust silencer internal to generator enclosure. Exhaust silencer shall be of critical grade. Enclosures shall be sound attenuating and weatherproof.

6. Generator shall be skid mounted and housed in a weatherproof enclosure.

7. Provide a 1 1/4” empty conduit with pull rope from ATS to telephone backboard for future remote monitoring.

8. Provide a remote annunciator panel to be located in Building 2603 Quarterdeck, including control wirings and conduit for the generator, coordinate with User during design for final location.

9. Size the generator fuel tank for a minimum of 3 days fuel at full load.

C. Provide uninterruptible power supply system (UPS) for the following equipment:

1. Fire alarm system in accordance with NFPA 72, UFC 3-600-01, and Section D40 of the RFP.

D509003 Grounding Systems

A. Provide a complete grounding system for the facility electrical and telecommunications systems.

B. Provide a grounding counterpoise loop, minimum #4/0 AWG, 211,600 circular miles, concentric stranded bare copper around the perimeter of the building. As a minimum, there shall be a ground well and ground rod at each corner of the counterpoise loop and at maximum 100 foot spacing. Provide round concrete base with flat steel cover ground well. Locate ground well in sod area.

C. As a minimum, the following systems shall be bonded to the counterpoise loop:

1. Service pad mounted transformer.

2. Building grounding electrode system.

3. Building structural steel.

4. Exterior electrical and mechanical equipment.

5. Grounding bars.

6. Lightning protection system.

7. Fences and gates.

8. Any other items or systems as required by the National Electrical Code and deemed necessary by the Designer of Record.

D. As a minimum, provide a grounding bar for each of the following rooms: all Electrical Rooms, all Communications Rooms, TOC Room, River OPS Control Watch Station, nearby User's antenna on top of roof, and rooms as deemed necessary by Designer of Record. Provide a green insulated equipment grounding conductor in raceway from each grounding bar to the building main grounding bar.

D509004 Lightning Protection

A. Provide a complete lightning protection system including, but not necessarily limited to, strike termination devices, conductors, ground terminals, interconnecting conductors, surge suppression devices, and other connectors and fittings required for a complete and usable system.

B. Work shall include installation of a complete lightning protection such that the entire system meets the UL Master Label requirements.

C. Lightning Protection Systems shall not void the roof warranty.

D. The lightning protection supplier shall furnish shop drawings showing lighting protection system, installation details, and list of materials.

D509005 Electric Heating

A. Provide power wiring and connections as required for all electric heating systems and equipment.

D509006 Energy Management Control System

A. Provide power wiring and connections as required for all systems and equipment. Coordinate connection requirements with pad mounted service transformer kWH metering. Monitoring systems shall include status for a single external controller for exterior and parking lot.

E. EQUIPMENT AND FURNISHINGS

E10 EQUIPMENT

Refer to Part 4 Section E10 for performance requirements of the building systems included in the equipment systems.

SYSTEMS DESCRIPTION

Provide food service equipment at locations indicated in “Room Requirements.”

E1010 COMMERCIAL EQUIPMENT

E101005 Security and Vault Equipment

A. Provide vault doors where indicated in the “Room Requirements.” Vault doors shall be provided with a combination (CD X09) lock and day gate.

E1040 GOVERNMENT FURNISHED EQUIPMENT

Rough-in and provide connections for Government-furnished equipment such that equipment will operate as intended, including providing miscellaneous items such as plugs, receptacles, wire, cable, conduit, flexible conduit and outlet boxes or fittings. Coordinate with the Government and Users for locations and power requirements for these items. The following items will be furnished and installed by the Government (GFGI):

E104001 Smart Board

E104002 Overhead Projector

E104003 VTC Equipment

E1090 OTHER EQUIPMENT

E109002 Food Service Equipment

A. Provide the following food service equipment in the coffee mess area of the River Ops Control Watch Station.:

1. Refrigerator/freezer (part of CID Package).
2. Microwave oven (part of CID Package).
3. Garbage disposal (include in Contractor’s Base Proposal).

E20 FURNISHINGS

Refer to Part 4 Section E20 for performance requirements of the building elements included in furnishings.

SYSTEM DESCRIPTION

Furnishings shall include fixed furnishings.

GENERAL SYSTEMS REQUIREMENTS

Design and provide fixed furnishings for all areas as indicated in the Room Requirements matrix and as required and appropriate for other areas.

Design a comprehensive interior movable furniture and furnishings package and prepare supporting plans and specifications (procurement data).

All fixed and movable furnishings selections shall be closely coordinated with Sections C10, “Interior Construction,” and C30, “Interior Finishes.”

Both fixed and movable furniture and furnishings shall be fully integrated with the building systems.

E2010 FIXED FURNISHINGS

E201002 Window Treatments

A. All windows and other glazed openings to the exterior of the building shall be provided with venetian blinds.

E2020 MOVABLE FURNISHINGS

Provide the Comprehensive Interior Design furnishings package in accordance with UFC 3-100-10N, "Design: General Architectural and Interior Design Requirements," UFC 3-120-10 "Design: General Interior Design Requirements," and other portions of this RFP. **The Interior Designer shall be N.C.I.D.Q. certified and may not be affiliated in any way with a furniture manufacturer or dealership**. **The Interior Designer must also have completed at least one similar project or two other furniture projects for the U.S. Federal Government.**

B. The Base Price Proposal for movable furnishings shall include design costs.

C. At the beginning of the facility design, the Contractor's Project Manager or his designated representative and the Contractor's Project Interior Designer shall be required to attend an orientation at Naval Facilities Engineering Command (NAVFAC) Southeast. The orientation will either occur in Jacksonville, FL or in Charleston, SC. Other attendees are welcome at the Contractor's discretion. The Interior Designer attending shall be the professional assigned to do the work. During the orientation, the required interior design process shall be reviewed in detail including the four required design meetings and the three required design submittals. These are minimum requirements and the Contractor shall be prepared to provide any/all additional meetings and submittals that may be necessary to support the interior design effort and collateral equipment coordination.

D. The design for moveable furnishings shall be preceded by in-depth customer interviews to determine actual initial outfitting requirements. The interviews shall be conducted by the Contractor's Interior Designer and minutes of the meetings provided to the NAVFAC Southeast Interior Designer within 14 days of the final interviews.

E. The customer shall be responsible for providing a list of any required equipment and its associated cost estimate to the Interior Designer. The Interior Designer shall be responsible for confirming requirements, identifying any changes or additions, and incorporating the final equipment size, mechanical, power, and communications, etc., requirements into the building design. The final equipment needs shall be incorporated into the final CID package. Note that some equipment is additionally identified in the E1090 section of this program.

F. Also required is space planning with comprehensive furnishings layout plans, selection of new furniture and furnishings with all associated fabrics and finishes and development of specifications sufficient to allow accurate procurement from government sources, primarily General Services Administration (GSA) Federal Supply Schedules. This is in accordance with the Federal Acquisition Regulations (FAR) Part 8 Required Sources of Supply from government sources. Best Value Determination shall be performed on at least 3 manufacturers for furniture items exceeding a total of $2,500. Documentation to include price quotes and signed Best Value Determination Statements shall be provided to the Government with the final CID package.

G. Freight charges, if any, and installation costs shall also be included in the final CID/FF&E package. The comprehensive interior design for moveable furnishings shall demonstrate complete coordination with every aspect of the building design.

H. The Contractor, as an option, may be authorized by the Government Contracting Officer to procure all furniture/furnishings using negotiated price schedules from GSA or other Federal contracts. The amount of this contract will be the actual cost of these items from the GSA price schedules, any freight charges for shipment to the project site, and installation. Only professional, manufacturer trained/authorized installers shall be utilized. A Contractor's overhead fee, not to exceed 10%, shall be authorized. No other charges, expenses, fees, markups, etc. will be authorized. The Contractor shall be acting as an agent for the Government, purchasing under Federal Contract, i.e., GSA, and shall not charge or assess Federal or state taxes. The Contractor shall coordinate the appropriate tax exemption certificates with the Government Contracting Officer.

I. The government will provide separate funding for procurement of the CID package. Construction Project funds will not be used. The budget will be available at a later date. The Government may modify the

construction contract to include the procurement and installation of all furnishings and equipment identified in the CID package.

E202001 MOVEABLE ARTWORK

A. Provide as part of the CID Package.

E202002 MODULAR PREFABRICATED FURNITURE

A. Provide as part of the CID Package.

E202003 FREESTANDING FURNITURE

A. Provide as part of the CID Package.

E202004 ACCESSORIES

A. Provide as part of the CID Package.

E202099 OTHER MOVEABLE FURNISHINGS

A. Provide as part of the CID Package.

F. SPECIAL CONSTRUCTION AND DEMOLITION

F10 SPECIAL CONSTRUCTION

F1010 SPECIAL STRUCTURES

F101001 Metal Building Systems

A. Provide metal building system for Boat Storage Buildings.

F1030 SPECIAL CONSTRUCTION SYSTEMS

F103001 Vaults

A. Provide vault wall, floor, roof, and door construction in accordance with DoD 5100.76-M and OPNAVINST 5530.13C for slabs in rooms for storage of Class II AA&E.

G. BUILDING SITEWORK

G10 SITE PREPARATIONS

Refer to Part 4 Section G10 for performance requirements of the elements included in site preparations.

SYSTEM DESCRIPTION

The site preparation system consists of site clearing, demolition, and earthwork necessary to ready the site for other work associated with the project.

GENERAL SYSTEM REQUIREMENTS

Develop the project site and perform all off-site work necessary to meet the requirements of the project, antiterrorism criteria, local codes, reference standards, technical specifications, and performance criteria.

A topographic survey of the existing site has been performed and is included in Part 6 Attachments. Prior to starting work, physically verify the location of all existing utilities and obtain all additional survey data required to provide a quality final design. The cost of any additional survey work shall be included in the contract amount.

A subsurface investigation report has been performed to support this project and is attached in Part 6. Prior to starting work, obtain all additional soil borings, testing or other geotechnical information required to provide a final design. The cost of any additional geotechnical work shall be included in the contract amount.

Unless otherwise noted, provide new facilities approximately at the locations indicated on the Performance Drawings included in Part 6.

Minimize the impact of construction activity on operations and neighboring facilities.

Identify and obtain all permits to comply with all Federal, state, and local regulatory requirements associated with this work. The Contractor shall submit a completed "Permits Record of Decision" (PROD) form with the first design submittal package. A blank PROD form is available in the UFC 3-200-10N, “Design: General Civil/Geotechnical/Landscape Requirements.” Contractor shall determine correct permit fees and pay said fees. Copies of all permits, permit applications, and the completed PROD form shall be forwarded to the NAVFAC Southeast Civil Reviewer.

Coordinate and obtain the ROICC approval for proposed haul route(s), work site access point(s), employee parking location(s) and material laydown and storage area(s). Temporary laydown, storage and parking areas shall be within the project work limits.

Refer to Site Analysis and Building Requirements sections for additional site preparation functional program information.

G1010 SITE CLEARING

G101001 Clearing

A. The Contractor shall clear all trees, shrubs, brush, and vegetation necessary for construction of the project.

G101002 Tree Removal

A. Remove and dispose of all trees as required for project construction.

B. Preserve and protect trees and shrubs not requiring removal for this work.

C. At the helipad site, remove and trim trees and brush to meet clear zone requirements of UFC 3-260-01, “Airfield and Heliport Planning and Design.” Also remove all trees and brush to at least 20 feet outside the new section of fence.

D. At the main complex area, remove all trees and brush within the new perimeter fence and within 20 feet along the exterior of the new fence.

G101003 Stump Removal

A. Remove and dispose of all stumps within the limits of the project.

G101005 Grubbing

A. Within the clearing limits, remove and dispose of all logs, shrubs, brush, matted roots, and other debris to a depth of at least 18 inches below ground surface.

G101007 Debris Disposal

A. All grubbing and clearing residue, demolished material, rubbish, and debris generated by this project shall be hauled off-site and off Station by the Contractor. Dispose of debris in a legal manner off Government property.

G1020 SITE DEMOLITION AND RELOCATIONS

G102002 Above Ground Site Demolition

A. The Contractor shall provide all above ground site demolition as necessary for construction of the project, including portions above and below the water level.

B. Prevent the spread of dust and debris to occupied portions of a building or on pavements and avoid the creation of a nuisance or hazard in the surrounding area.

C. Provide temporary traffic control in accordance with MUTCD.

D. Protect existing work that is to remain in place, be reused, or remains the property of the Government.

E. Preserve and protect existing structures and active utilities within the work areas that do not require demolition.

F. Make the maximum use of low-noise emission products, as certified by the EPA.

G102003 Underground Site Demolition

A. The Contractor shall provide underground site demolition as necessary for construction of the project.

B. Preserve and protect existing structures and active utilities within the work areas that do not require demolition.

G102005 Utility Relocation

A. Relocate all utilities necessary to create a properly functioning facility. Replace only with new. Comply with the requirements of all state and local rules and regulations, the nationally recognized code, and the requirements of the utility provider covering the specific utility.

B. Do not locate new buildings or structures over existing or new utilities. Relocate any utility impacted by new buildings or structures.

G102007 Site Cleanup

A. Remove rubbish and debris daily. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

G1030 SITE EARTHWORK

G103001 Grading

A. Finish floor elevations for new facilities shall be a minimum of 6 inches above finished grade at the perimeter of the building, except where requirements for vehicle access exists.

B. Finish floor elevations for new facilities shall be above the 100 year flood elevation. Provide elevations for mechanical/electrical equipment pads above the 100 year flood elevation and at least 6 inches above surrounding finish grades.

C. As much as possible, the Contractor shall preserve natural topographic features to minimize the impact on the existing drainage patterns and adjacent to the site.

D. Grade areas to provide positive drainage and avoid standing water.

E. Where necessary provide stabilization of slopes subject to erosion.

G103002 Common Excavation

A. Preserve natural topographic features to minimize cut and fill requirements, provided other requirements of this RFP are satisfied and the design intent is not compromised.

B. Provide undercutting within the Main Complex area in accordance with G103099.

G103003 Rock Excavation

A. Requests for additional compensation shall not be made by the Contractor for degree of hardness or difficulty encountered in removal of material. Blasting is not permitted.

G103004 Fill and Borrow

A. Borrow and select fill shall come from off-Base sources.

G103005 Compaction

A. Provide compaction in accordance with UFGS Specification 31 23 00.00 20, “Excavation and Fill,” as applicable.

G103006 Soil Stabilization

A. Provide soil stabilization using geosynthetics, such as geotextiles and geogrids, lime, cement, lime slurry, or asphalt, designed to function as required by site conditions. If necessary, provide rubble or stone riprap on slopes, especially those subject to wave attack from wind and storms.

B. Provide protection along the side and base of the boat ramp to prevent long term erosion as well as undermining from runoff, wave attack and boat prop wash.

G103007 Slope Stabilization

A. Provide slope stabilization through appropriate grading and site design for a minimum factor of safety of 1.5 or slope that does not exceed the maximum slope per local code requirements. Where necessary, use the following techniques for slope stabilization: geogrids, gabions, riprap, or concrete.

B. Ditch slopes shall be maximum 3:1, but preferably 4:1, with suitable erosion control features.

C. Provide suitable temporary erosion and turbidity control measures throughout construction.

G103008 Soil Treatment

A. Treat the area around the entire foundation of each building for termites in accordance with Part 5 Prescriptive Specification Section 02360, “Soil Treatment for Subterranean Termite Control.”

G103009 Shoring

A. Provide sheeting, shoring, bracing, cribbing, and underpinning as required for project construction.

G103010 Temporary Dewatering

A. Provide temporary dewatering as required for project construction.

B. All dewatering effluent shall be treated to meet Federal, state and local water quality standards before discharge.

G103011 Temporary Erosion and Sediment Control

A. Develop, implement, and maintain temporary erosion and sediment control measures and other Best Management Practices (BMPs) prior to or in conjunction with commencement of earthwork in accordance with the state Erosion and Sediment Control Laws and Regulations.

B. Construct temporary measures including but not limited to filter barriers, silt fence, inlet protection, culvert protection, construction entrance, dust suppressors, temporary seeding, and erosion control matting to reduce on-site erosion and off-site runoff and sedimentation.

C. Prepare a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Part 2 Section 01575N, “Temporary Environmental Controls.”

D. Perform all monitoring, inspection, and reporting services as required by State and Federal regulations and the conditions of any permits issued for this work.

G103099 Other Site Earthwork

A. For historic and archaeologic artifacts, refer to Part 2 Section 01575N, “Temporary Environmental Controls.”

B. The preliminary geotechnical investigations have indicated there are soft compressible materials present within the limits of the proposed Main Complex that require removal to limit potential settlements of new facilities. Geotechnical reports are included as attachments in Part 6 of this RFP. The Contractor is responsible for engaging geotechnical engineering services, performing any desired additional investigations, and developing site preparation requirements as part of the project

design. Based on preliminary recommendations in the March 26, 2008 Geotechnical Report, undercutting is required for building and pavement areas. For purposes of developing his proposal the Contractor shall assume:

- After clearing and grubbing, the areas beneath the Operations Building, Boat Maintenance Building, and Boat Storage Building,, and to at least 10 feet beyond building footprints shall be undercut to at least 4 foot depth and replaced with compacted select fill.

- After clearing and grubbing, the approximate areas of additional undercut indicated in Figure 1 in the March 26, 2008 Geotechnical Report shall be undercut to at least elevation +4.0 feet and replaced with compacted select fill.

- Excavations and transitions for undercut areas shall be performed to minimize the potential for differential settlements.

- The Contractor's proposal shall include required undercutting and replacement quantities for the approximate areas described above plus an assumed additional quantity of at least 25 percent for variability in actual limits for these areas. The proposal shall also include the cost of additional geotechnical investigations and engineering to better define remedial action requirements.

G20 SITE IMPROVEMENTS

Refer to Part 4 Section G20 for performance requirements of the elements included in site improvements.

SYSTEM DESCRIPTION

The site improvements system consists of pavements and pavement related features, landscaping and other exterior site development work related to this project.

GENERAL SYSTEMS REQUIREMENTS

Provide site improvements as required to make a usable facility that meets functional and operational requirements; incorporates all applicable antiterrorism, force protection, and physical security requirements; and blends into the existing environment.

Provide site improvements in conformance with applicable requirements of the Uniform Federal Accessibility Standards.

Identify and obtain all permits to comply with all Federal, state, and local regulatory requirements associated with this work. The Contractor shall complete the "Permits Record of Decision" (PROD) form with the first design submittal package. The PROD form is in the UFC 3-200-10N, "Design: General Civil/Geotechnical/Landscape Requirements." Contractor shall determine correct permit fees and pay said fees. Copies of all permits, permit applications, and the completed PROD form shall be forwarded to the NAVFAC Southeast Civil Reviewer.

Provide improvements as required to conform to all applicable anti-terrorism and physical security requirements. The new Operations Building is classified as a "Primary Gathering Building."

Minimize the impact of construction activity on operations and neighboring facilities.

A possible Site Plan has been included with the Performance Drawings in Part 6. This site has been developed through working sessions with the Users. The Contractor is permitted to make recommendations for alternate layouts, provided all site elements are included, all space location constraints are respected and approval is obtained from the Users.

Refer to Site Analysis and Building Requirements sections for additional site improvement functional program information.

G2010 ROADWAYS AND HELIPAD

A. Provide minimum 24 foot wide asphalt access drive to the main complex. Provide concrete pavement within the areas designated for Government vehicle parking and within the maintenance/circulation area of the main complex.

B. Provide paved circulation access to the Operations Building, Boat Maintenance Building, and Boat Storage Building similar to that shown on the Part 6 Performance Drawings. This access will be in violation of minimum ATFP standoffs, therefore, it shall be provided with signage and pavement markings/striping identifying it for Restricted Vehicle Access Only. No parking shall be permitted within the required minimum standoff distance.

C. Maintain compliance with all antiterrorism requirements and minimum standoff distances.

D. Provide circulation and access to the Maintenance Building and Boat Storage Building for trailered boats. The design towing vehicle is an FMTV of approximately 24.5-foot length and design boat/trailer of approximately 36-foot length and 9-foot beam.

E. The design of pavements shall take into consideration the anticipated daily traffic over the life of the project (20 years) as well as the existing soil conditions at the site.

F. Provide concrete pavement for the helipad. The configuration shall conform to the requirements for a standard VFR Helipad for Navy and UFC 3-260-01, "Airfield and Heliport Planning and Design." Provide a 24 foot wide concrete access drive to the helipad as indicated in the Part 6 Performance Drawings.

G. Slope paved areas to provide drainage away from new and existing buildings and other structures.

G201001 Bases and Subbases

A. Refer to applicable UFGS Specification sections listed in Part 4 Section G20, "Site Improvements."

B. Crushed concrete meeting specified gradation for aggregate base or subbase courses may be used.

G201002 Curbs and Gutters

A. Provide concrete curbs and gutters or curbs adjacent to landscape islands within the POV parking lot.

G201003 Paved Surfaces

A. All vehicular concrete pavement provided on the project shall be designed by the Contractor, however, it shall meet the following minimum requirements: For asphalt areas, provide minimum 2 inches of asphalt with 8 inches of base course. For concrete areas, provide minimum 7 inch thick concrete designed as non-reinforced pavement. Provide reinforcement in irregular concrete slabs. Design vehicle shall be an AASHTO HS-20 vehicle and fork lift loading provided in Part 4 Section A10. The actual required thicknesses shall be verified by standard asphalt and concrete pavement design analyses.

G201004 Marking and Signage

A. Provide permanent markings (pavement, curb, and object), signage (regulatory, warning, and guidance), and other traffic control devices as required to facilitate proper utilization of the roadways.

B. All roadways located within required antiterrorism force protection standoff distances shall be striped and marked for Restricted Vehicle Access Only.

C. Provide temporary signage in accordance with the MUTCD.

G201005 Guardrails and Barriers

A. Provide guardrails and bollards in accordance with UFC 3-200-10N, "Design: General Civil/Geotechnical/Landscape Requirements."

G2020 PARKING LOTS

A. Provide a minimum of 90 new parking spaces (45 shall be part of Base Bid Item and 45 shall be an Optional Bid Item), including accessible parking, staff, and visitors in the POV Parking Lot. Provide 4 additional motorcycle parking spaces (concrete pavement). Parking area shall be asphalt pavement, and minimum 9' x 18.5' spaces and 26-foot aisle

widths. Provide asphalt pavement designed in accordance with the minimum requirements established in Paragraph G2010 “Roadways.”

B. Provide a safe, convenient, and logical circulation throughout the parking area. Account for all traffic types, which may be associated with the parking area, including emergency response, trash collection and delivery vehicles.

C. Maintain compliance with all antiterrorism requirements and minimum standoff distances.

D. Provide handicapped parking in the POV Parking Lot in accordance with the Uniform Federal Accessibility Standards (UFAS).

E. Within the new complex, provide exterior concrete paved parking for approximately 30 Government vehicles (10 FMTVs and 20 F-550s) along with 4 truck and boat trailer units.

F. Slope paved areas to provide drainage away from new and existing buildings and other structures.

G202001 Bases and Subbases

A. Refer to Paragraph G201001.

G202002 Curbs and Gutters

A. Provide concrete curbs and gutters or curbs adjacent to landscape islands within the POV parking lot.

G202003 Paved Surfaces

A. Provide asphalt pavement design in accordance with the minimum requirements established in Paragraph G2010 Roadways.

B. Parking areas shall be of asphalt construction.

C. Recycled asphalt pavement material may not be used.

G202004 Marking and Signage

A. Provide permanent markings, signage, and other traffic control devices as required to facilitate proper utilization of the parking areas.

B. Provide markings for an accessible route between the POV Parking Lot and the Operations Building.

G202005 Guardrails and Barriers

A. Provide guardrails and bollards in accordance with UFC 3-200-10N.

B. Provide bollards at all vehicle access doors for the Boat Maintenance Building and Boat Storage Building.

G2030 PEDESTRIAN PAVING

A. Provide a network of concrete sidewalks for circulation between the parking areas and new buildings and other areas for general circulation between various elements of the project.

G203003 Paved Surfaces

A. Sidewalks shall be reinforced Portland cement concrete pavement, minimum thickness 5 inches. Provide broomed finish.

B. Provide contraction and expansion joints.

C. Provide handicapped ramps of reinforced Portland cement concrete pavement.

G2040 SITE DEVELOPMENT

A. Provide minimum antiterrorism standoff distances from new buildings in accordance with UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings.” The new Operations Building is classified as a Primary Gathering Building.

B. Provide concrete pads to support all electrical and mechanical equipment. Tops of such pads shall be set 6 inches above grade unless indicated or directed otherwise.

C. Within the vicinity of the Boat Maintenance Building provide a minimum 6 foot by 10 foot concrete pad at least 8 inches thick to support a hazardous materials locker to be provided by the User. Coordinate exact size and location with the Users.

G204001 Fencing and Gates

A. Provide fence around new complex in accordance with Part 4 Section G20, “Site Improvements”. Locate approximately as indicated in the Part 6 Performance Drawings.

B. All exterior fencing and gates in this project shall meet requirements for security fence. Security fence shall be chain link with a fabric height of 8 feet with top and bottom tension wires. Provide double outriggers and dual coil barbed tape concertina on top, for an overall height of approximately 9 feet. Provide fencing similar to fencing of existing facility. Secure all fastening and hinge hardware by peening or welding to prevent disassembly of fence and gate components.

C. The vehicle access gate into the main complex shall be a motor operated double sliding gate with card readers on both sides for access control.

D. Provide a pedestrian turnstile through the fence between the POV Parking Lot and the Operations Building. It shall be of galvanized steel construction, three wing type, consisting of a rotor, cage, ceiling plate, and bottom bearing plate. It shall provide two-way access with card reader control on entry into the secure area.

E. Provide a minimum of two lockable single leaf swing gates, minimum 12 feet wide, at appropriate locations along the fence surrounding the main complex.

F. At the helipad complex remove portions of the existing fence that are within 100 feet of the new concrete pad and provide new continuous security fencing approximately as indicated in the Part 6 Performance Drawings along an alignment at least 100 feet clear of the concrete pad. Provide one manual, lockable swing gate in the new fencing to align with the new concrete drive.

G204002 Retaining Walls

A. Provide as required for development of the project. For information relative to the Sheet Pile Wall see Section A10.

G204005 Signage

A. Provide facility signage in accordance with other Base signs and this RFP.

G204099 Other Site Improvements

A. Provide a minimum of one (1) dumpster pad and enclosure. Provide to match existing dumpster pads and enclosures at Stennis Space Center. Locate in accordance with UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings” and such that it allows convenient access for the waste management trucks. Provide within the limits of the fenced complex.

B. Provide mooring hardware on Sheet Pile Quay Wall including cleats, fender rub strips, and attachment hardware.

C. At the helipad provide aircraft tie downs, a wind sock, and static discharge hook-up.

G2050 LANDSCAPING

A. Provide complete landscaping consisting of sod, hydro seeding, trees, shrubs, perennials, and ornamental grasses as required to provide a quality, cost-effective, functional and visually appealing landscape program that will enhance the development, while complying with all applicable antiterrorism, force protection and physical security requirements. Guarantee all landscaping for a period of one year after final acceptance of the project. Select landscaping materials that are native to the Stennis Space Center region and are drought tolerant.

G205001 Fine Grading and Soil Preparation

A. See Paragraph G10, Site Preparations.

G205002 Erosion Control Measures

A. See Paragraph G10, Site Preparations.

G205003 Topsoil and Planting Beds

A. See Paragraph G205005, Plantings.

G205004 Seeding, Sprigging and Sodding

A. All areas disturbed by the Contractor's operations shall be grassed. Sod all ditches in entirety and within 5 feet of all pavements and buildings. Sod full area around Operations Building. All other areas disturbed by Contractor's operations shall be hydro seeded.

B. All sod shall be Centipede.

C. All hydro seeding shall be Bermuda.

G205005 Plantings

A. Guarantee all landscaping for a period of one year after final acceptance of the project.

B. Provide maintenance period of 120 days in accordance with Part 4 Section G20.

G30 SITE CIVIL/MECHANICAL UTILITIES

Refer to Part 4 Section G30 for performance requirements of the elements included in site civil/mechanical utilities systems.

SYSTEM DESCRIPTION

The site civil/mechanical utility systems include water/fire supply systems, sanitary sewer systems, storm drainage systems, natural gas distribution systems and associated appurtenances that are more than 5 feet outside the buildings.

GENERAL SYSTEM REQUIREMENTS

Develop the site to provide water, fire protection, sanitary sewer, storm drainage, and natural gas distribution services that meet the requirements of each applicable regulatory agency that governs and issues permits for the construction and operation of these systems.

Provide each system complete and ready for operation.

In accordance with Part 2 Section 01141N, "Work Restrictions for Design-Build," physically verify the location of existing above and below ground utilities prior to starting work.

Identify and obtain all permits to comply with all Federal, state, and local regulatory requirements associated with this work. The Contractor shall complete the "Permits Record of Decision" (PROD) form with the first design submittal package. The PROD form is in the UFC 3-200-10N, "Design: General Civil/Geotechnical/Landscape Requirements." Contractor shall determine correct permit fees and pay said fees. Copies of all permits, permit applications, and the completed PROD form shall be forwarded to the NAVFAC Southeast Civil/Mechanical Reviewer.

Minimize the impact of construction activity on facility operations and neighboring facilities.

Potential utility points of connection are indicated on Performance Drawings in Part 6 of the RFP. Obtain final approvals from the NAVFAC Southeast Civil/Mechanical Reviewer and the Contracting Officer for all utility connection points associated with this work.

Coordinate with the local utility providers and pay any fees or charges required to connect to their utility.

Refer to Site Analysis and Building Requirements sections for additional site civil/mechanical utilities information.

Provide all required fittings, connections, and accessories required for a complete and usable system. All equipment shall be installed per the criteria of RFP Section G30 and the manufacturer's recommendations. Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall."

G3010 WATER SUPPLY

A. The new water system is an extension of the existing water system. The existing water system serving the project site is owned, supplied, and operated by the Federal Government. Provide the new water system and connections to the existing water system in accordance with UFC 3-200-10N, "Design: General Civil/Geotechnical/Landscape Requirements," and the state waterworks regulations; whichever is more stringent.

B. Water supply flow test results are included as an attachment in Part 6 of the RFP.

C. Provide any permits required by Federal, state, or local agencies.

G301002 Potable Water Distribution

A. The potential point of potable water connection is an existing 8 inch main adjacent to the access drive to the main complex. Approximate location is indicated on Performance Drawings included as an attachment in Part 6 of the RFP.

B. Provide a water meter on the building service line that can be read from the Facility's EMCS (Energy Management Control System). Provide 3-valve lockable by-pass on water meters to enable work on meter without shutting off building service.

C. Provide an isolation valve at the new service line connection to the main.

D. Where backflow prevention is required, backflow preventers shall not be allowed aboveground outside the building.

E. Obtain a permit from the State of Mississippi for the extension of the Station's water distribution system.

G301004 Fire Protection Water Distribution

A. The potential point of fire protection water connection is an existing 8 inch main adjacent to the access drive to the main complex. Approximate location is indicated on Performance Drawings included as an attachment in Part 6 of the RFP.

B. The main control valve for incoming fire service shall be a post indicator valve. The post indicator valve shall be provided with a tamper switch and alarm, which shall be transmitted via a Monaco System to Building 2101.

C. Provide a suitably marked fire department connection at the exterior of the building. Locate connection near the front of the building, within 15 feet of the pavement for fire truck access. Exact locations shall be approved by the Fire Chief.

D. Provide fire hydrants around the buildings and parking areas in accordance with UFC 3-600-01. Exact locations shall be approved by the Fire Chief.

E. See Section D40, "Fire Protection," for additional information.

G3020 SANITARY SEWER

A. The new sanitary sewer system is an extension of the existing sanitary sewer collection system. The existing sanitary sewer collection system serving the project site is owned, operated, and maintained by the Federal Government. Provide the new sanitary sewer system and connections to the existing sanitary sewer collection system in accordance with UFC 3-200-10N, "Design: General Civil/Geotechnical/ Landscape Requirements," and the state sewerage regulations; whichever is more stringent.

B. The potential point of sanitary sewer connection is the existing lift station No. 33 and force main located east of the main complex. The approximate location is indicated on the Performance Drawings in Part 6 of this RFP. The Contractor shall assume it will be necessary to install a new lift station for this project and shall install a new force main extending to existing lift station No. 33. The Contractor shall include in

his bid an independent determination of the actual capacity of the existing lift station and force main based on a field assessment of the existing pumps, force main, etc. and confirm its feasibility in supporting this project. The Contractor shall have the option of providing a gravity collection main connecting to this existing lift station if it is found that elevations and routing acceptable to the Navy would allow for gravity distribution.

C. Obtain any permits for the lift station(s)/distribution system as required by Federal, state, and local permitting authorities.

G302001 Sanitary Sewer Piping

A. Locate and provide in accordance with UFC 3-200-10N and Part 4 Section G30.

G302002 Sanitary Sewer Manholes and Cleanouts

A. Locate and provide in accordance with UFC 3-200-10N and Part 4 Section G30.

G302003 Lift Stations and Pumping Stations

A. The new sanitary sewer lift station shall meet the following requirements.

B. Provide a duplex submersible pump or duplex grinder pump station in accordance with UFC 3-200-10N and Part 4 Section G30.

C. Provide automatic control to start and stop the pump system.

D. Provide a telemetry system and recording equipment to a location manned 24 hours a day for the transmission and recording of pump operation. Alarms shall be transmitted to a location manned 24 hours a day.

E. Provide electrical connections for a portable emergency generator hook-up.

G3030 STORM SEWER

A. Stennis Space Center uses a series/system of ditches throughout the Base to detain all stormwater.

B. Potential point of stormwater discharge shall be the East Pearl Canal south of the main complex. The Contractor shall positively drain the site, collect the water, and convey it to the point of discharge.

C. Provide the new storm sewer system and connections to the existing storm sewer system in accordance with UFC 3-200-10N, “Design: General Civil/Geotechnical/Landscape Requirements,” and the state stormwater management laws and regulations; whichever is more stringent.

D. The existing drainage systems and channels that run through the main complex shall be replaced with underground conveyance systems of large diameter pipes or a box culvert. The conveyance systems shall be sized to maintain the existing capacity as well as accommodate new flows from this project.

G303001 Storm Sewer Piping

A. Refer to UFGS Specification 33 40 01, “Storm Drainage.” Provide reinforced concrete pipe, Class III minimum. Flaired-end sections are not permitted.

B. Use 10-year storm event for design purposes.

G303002 Storm Sewer Structures

A. Refer to UFGS Specification 33 40 01, “Storm Drainage.”

G303004 Culverts

A. Refer to UFGS Specification 33 40 01, “Storm Drainage.”

G303005 Headwalls

A. Refer to UFGS Specification 33 40 01, “Storm Drainage.”

G303006 Erosion and Sediment Control Measures

A. Develop, implement and maintain temporary erosion and sediment control measures and other Best Management Practices (BMPs) prior to or in conjunction with commencement of earthwork in accordance with the state Erosion and Sediment Control Laws and Regulations. Construct temporary measures including but not limited to filter barriers, silt fence, inlet protection, culvert protection, construction entrance, dust suppressors, temporary seeding, and erosion control matting to reduce on-site erosion and off-site runoff and sedimentation.

B. Prepare a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Part 2 Section 01575N, “Temporary Environmental Controls.”

G303007 Stormwater Management

A. The proposed project shall provide a permanent low impact design, swales, underground conveyance systems, and other drainage features to regulate stormwater runoff and to prevent flooding impacts to the site and to offsite areas. Integrate stormwater management ponds, swales, etc. into the total site design (where feasible) to provide an aesthetically pleasing and harmonious landscape. Develop and construct drainage features in accordance with UFC 3-200-10N, “Design: General Civil/Geotechnical/ Landscape Requirements.”

B. Confirm the existing outfall/stormwater management system has adequate capacity to receive the additional stormwater flows generated by the project or design additional stormwater management capacity.

G3060 FUEL DISTRIBUTION

G306005 Gas Distribution Piping (Natural Gas)

A. The potential point of natural gas connection is an existing 2 inch line north of the main complex and adjacent to Endeavor Boulevard. The approximate location is indicated on the Performance Drawings included as an attachment in Part 6 of the RFP.

B. The Contractor shall coordinate and extend the natural gas distribution to support heating and HVAC equipment, potable water heating equipment and emergency generator power required by other parts of the RFP.

G40 SITE ELECTRICAL UTILITIES

A. Refer to Part 4 Section G40 for performance requirements of the elements included in the site electrical utilities systems.

SYSTEM DESCRIPTION

A. Provide complete site electrical utilities consisting of electrical distribution, site lighting, and site communication and security including equipment, cables/wiring between existing utility point of connection and building, including all associated connections, connecting hardware, devices, accessories, and materials as necessary and required for a complete and usable system. This section covers installations up to within 5 feet of new building location.

GENERAL SYSTEM REQUIREMENTS

A. Provide site electrical utilities complete in place, tested and approved, as specified throughout this RFP, as needed for a complete, usable and proper installation. All equipment shall be installed per the criteria of RFP Part 4, Section G40 and the manufacturer’s recommendations. Where the word “should” is used in the manufacturer’s recommendations, substitute the word “shall.”

B. Refer to SSC Facility Electrical Standard (SSTD-8070-0081-ELEC) in Part 6 of the RFP for additional electrical requirements. If conflict arises between SSTD-8070-0081-ELEC and the RFP, stricter requirements shall take precedence.

C. Provide pull ropes in each spare, empty, or unused raceway installed as part of this project.

GOVERNMENT FURNISHED EQUIPMENT

A. Refer to Part 3 Section D50 for listing of Government Furnished Equipment.

G4010 ELECTRICAL DISTRIBUTION

A. Electrical characteristic for this project is 13.8KV, 3 Phase, ungrounded Delta primary. Secondary voltage shall be determined by the Designer of Record during the design phase. Provide 18 KV lightning arrestors.

B. The connection point shall be underground at existing utility power pole as indicated in Part 6 of the RFP and extended to the project site underground in ductbank and manholes to a service Pad Mounted Transformer.

C. With the exception of overhead to underground transitions at riser poles, all electrical distribution shall be via underground ductbank and manholes.

D. The available fault current at the point of connection shall be assumed to be an infinite bus.

G401002 Transformers

A. Provide service pad mounted transformer(s), primary and secondary underground conductors and conduit, CT cabinet, conduit risers, service entrance fittings, etc., for complete installations. Follow transformer manufacturer's recommendations for concrete pad requirements. Maximum transformer size shall be 750KVA. Provide parallel transformers if required. Use loop type transformer(s). Provide copper windings for transformers.

B. Locations of new service pad mounted transformers and emergency generator shall be out of view of building visitors. Final locations must be coordinated with Public Works Department.

C. Provide switches, controls, and devices as required.

G401004 Overhead Electric Conductors

A. Provide a three phase overhead pole primary distribution lines from existing utility pole to a new riser pole.

G401005 Towers, Poles, Crossarms and Insulators

A. Construct new riser pole for overhead primary distribution line as required for connections to the existing utility pole as indicated in Part 6 of the RFP. Provide overhead to underground transitions at new riser pole. Install and guy new riser pole appropriately. Provide horizontal fiberglass cross arm for new riser pole. Locate riser pole at a minimum 60' north of existing utility pole #52 or at location as directed by NASA high voltage personnel. New riser pole shall be in-line with the existing 13.8kv primary distribution system. Pole top construction shall be single arm tangent. Use minimum 45' wood pole. Final termination of primary conductors will be provided by NASA high voltage personnel.

G401006 Underground Electric Conductors

A. Provide medium voltage cables and 600 volt secondary underground service entrance conductors and conduit to meet the connection requirements as indicated in paragraph G4010 "Electrical Distribution."

B. Provide a complete underground distribution system for all exterior site lighting and communications.

G401007 Ductbanks, Manholes, Handholes and Raceways

A. Provide a system of concrete encased ductbanks, handholes, manholes, and raceways for all underground power wiring.

B. Provide 2 – 6" concrete encased ductbank for primary underground distributions. Bury ductbank at a minimum of 3' below finished grade to top of concrete. Cut and trench existing roadway as required. Do not utilizing boring under roadway. Roadway should be cut and filled with crushed limestone, allowed to settle over several weeks, followed by removal of 6" of limestone and capping with asphalt.

C. Provide PVC Schedule 80 conduits for secondary service entrance conductors. Bury conduit at a minimum of 30" below finished grade. Provide rigid galvanized steel conduit with PVC coating for conduit riser and elbows.

G401008 Grounding Systems

A. Provide a complete grounding system for the electrical power distribution system.

G401009 Metering

A. Provide a programmable digital type multi-function (kWh and demand) meter with pulse initiators for each service pad mounted transformer(s).

B. Provide 1" empty conduit with pull rope to the nearest telephone backboard for remote monitoring. Stub-up 12" above finished grade and directly below meter cabinet. Cap and tag the conduit.

G4020 SITE LIGHTING

A. Provide an exterior site lighting system including, but not necessarily limited to, sidewalks, parking lot, roadway, and all areas with concrete or asphalt pavement, consisting of underground distribution, handholes, grounding, poles, fixtures and controls as required for a complete and usable system. Fixtures intended to illuminate site areas shall not be located on the building. All exterior lighting shall be coordinated and integrated into the overall design of the site and building.

G402003 Towers, Poles, Crossarms and Insulators

A. Provide aluminum pole complete with foundations and concrete pedestal for site lighting.

G402004 Underground Electric Conductors

A. Provide a complete underground distribution system for all exterior site, roadway, and parking lot lighting.

G402005 Ductbanks, Manholes and Handholes

A. Provide a direct buried underground system including conduits and handholes to meet the connection requirements indicated in paragraph G4020, "Site Lighting."

G402006 Exterior Lighting Fixtures and Controls

A. Provide 150W high pressure sodium type lighting fixtures to match Station's standards, complete with lamps and ballasts. Metal halide lamps shall only be used as necessary to comply with security or access control requirements.

B. Provide an automatic lighting control system for exterior lighting fixtures utilizing lighting contactors, programmable time clock controllers capable of controlling each circuit in programming different time zones, and photocell switches such that lighting maybe both, manually controlled or automatically operated.

C. External and parking lighting control shall be provided with a single controller with "on" being the default failure condition and on/off status provide to the EMCS.

G402007 Grounding Systems

A. Provide a complete grounding system for all exterior area, parking lot, and roadway lighting.

G4030 SITE COMMUNICATION AND ELECTRONIC SECURITY SYSTEMS

A. Provide a site communication system including, but not necessarily limited to, Voice and Data Telecommunications Systems, Security and CCTV Systems, and Cable Television (CATV) System, including all conduit and wiring, underground infrastructures, termination equipment, and grounding systems as required for a complete and usable system.

G403001 Telecommunications Systems

A. The connection point for the site Voice and Data Telecommunications Systems and PA Systems shall be in the Main Server Room of Building

2606 as indicated in Part 6 of the RFP and extended to the project site via new and existing manholes and concrete encased ductbanks.

B. The connection point for the site Security and CCTV Systems shall be at the existing concrete pull box for CCTV & Security System as indicated in Part 6 of the RFP and extended to the project site via new and existing manholes and concrete encased ductbank. Concrete pull box is located north of utility pole #52 and adjacent to existing CCTV camera mounted on pole. Provide empty conduit infrastructure for Security & CCTV Systems.

C. Provide 48 single mode/ 12 multi-mode outside plant fiber optic cable for voice and data network from the Main Communications Room of the new Operations building to Building 2606. Telephone will be provided via VOIP (Voice Over Internet Protocol). The Government will install network switches in the new Operations building for internet access (data) and internet telephony (voice).

D. Provide 25 pairs, copper service entrance outside plant copper cable for analog signals such as fax, STU phones, etc. from the Main Communications room to Building 2606.

E. Provide outside plant cable for PA system.

F. Provide "LGX" fiber optic patch panels to be installed in existing relay racks for fiber optic terminations in existing Building 2606. Provide "LGX" fiber optic patch panels and relay racks as described in D503003 for fiber optic cable terminations in the new Operations building.

G. Provide wall mounted 110 punch down blocks for terminations of copper cables at each ends.

G403003 Fire Alarm Systems

A. See Section D40, "Fire Protection," and Section D50, "Electrical," for additional requirements.

G403004 Cable TV Systems (CATV)

A. The connection point for the site CATV System shall be in the Main Server Room of Building 2606 as indicated in Part 6 of the RFP and extended to the project site via new and existing manholes and concrete encased ductbanks.

B. Provide outside plant cable for CATV from the Main Communications Room to Building 2606.

G403005 Cables and Wiring

A. Cables and wiring for site telecommunications shall be as indicated in their respective categories.

G403006 Ductbanks, Manholes and Handholes

A. Provide a system of conduits, manholes, and handholes for site telecommunications.

B. Provide 6 – 4" concrete encased ductbank from new Operations Building to the nearest existing communications manhole as indicated in Part 6 of the RFP and as follows:

1. 1 – 4" c. with 3 – 1 ¼" innerduct. Utilize one of the innerduct for voice/telephone fiber optic cable. Extend fiber optic cable via existing ductbank and manholes to Building 2606.

2. 1 – 4" c. for CATV and PA cables. Extend cables via existing ductbank and manholes to Building 2606.

3. 1 – 4" c. for security and CCTV systems. Extend 1 – 2" conduit from the nearest manhole to the two existing site light poles by the boat ramp area for CCTV cameras.

4. 1 – 4" c. for future fire alarm tie-in.

5. 2 – 4" spare conduit for future use.

C. Provide transition from concrete encased ductbank to rigid galvanized steel conduit prior to entering the new Operations Building. Terminate conduit in the Main Communications room.

D. Bury ductbank at a minimum of 3’-0” below finished grade to top of cover.

E. Ductbank exceeding 500’ shall be provided with a communications manhole. Communications manhole shall be 12’L x 6’W x 6’D to match Station’s standards.

G403009 Grounding Systems

A. Provide a complete grounding system for all site telecommunications systems.

G403098 Other Communication and Alarm

A. Provide connection to the Base mass notification system.

PART 4

PERFORMANCE TECHNICAL SPECIFICATIONS

SECTION	**A10**	**FOUNDATIONS**
SECTION	**B10**	**SUPERSTRUCTURE**
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SECTION A10

FOUNDATIONS
12/04

A10 GENERAL

A10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for the foundation of the buildings, including footings, piles and piers and pile caps, foundation walls, and earthwork.

A10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

A10 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

A10 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 3-220-01, “Geotechnical Engineering Procedures for Foundation Design of Buildings and Structures”

UNITED FACILITIES CRITERIA (UFC)

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 31 23 00.00 20, “Excavation and Fill”

UFGS 31 41 16, “Metal Sheet Piling”

UFGS 09 97 13.26, “Coating of Steel Waterfront Structures”

UFGS 09 97 13.28, “Protection of Buried Steel Piping and Steel Bulkhead Tie Rods”

A10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “Design: General Building Requirements”,

UFC 1-300-09N “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-220-01, “Geotechnical Engineering Procedures for Foundation Design of Buildings and Structures”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-310-01, “Design: Structural Load Data”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-152-07N, “Design: Small Craft Berthing Facilities”

A10 1.3.1 - Antiterrorism

All work shall comply with UFC 1-040-01, “DoD Minimum Antiterrorism Standards for Buildings”.

A10 1.3.2 - Design Parameters

A10 1.3.2.1 - Live Loads

Live loads for uses not provided in UFC 3-310-01 shall be as follows:

Land Behind New Sheet Pile Wall	300 psf
Mooring Load on Wall (Line pull acting in any direction at a 45 degree angle from the horizontal)	400 lb

A10 1.3.2.2 - Importance Factors

The Occupancy Category for determining Importance Factors for seismic, snow, and wind design shall be Group II in accordance with Table 1 of UFC 3-310-01. The corresponding Seismic Use Group is I.

A10 1.3.2.3 - Wind Exposure

Wind speed is defined by UFC 3-310-01. Wind design shall be based on this requirement, and the IBC and ASCE 7-02 for a coastal hurricane-prone region, with the most stringent requirements taking precedence.

A10 1.3.2.4 - Ground Motion Study

A site-specific seismic ground motion study is not required.

A10 1.3.2.5 - Floor Slab Loading

Special loading to be incorporated into the design shall include:

	Fork Lift		Truck Vehicle Loading	
	Max. Axle Load (lbs)	Passes Per Day	Max Axle Load (lbs)	Passes Per Day
Boat Maintenance/ Storage Areas	40,000	10	32,000	10

A10 1.3.3 - Subsurface Soils Information and Geotechnical Report

Subsurface soil information and a geotechnical report are included in other portions of this RFP. This information is included for the

Contractor's information only, and is not guaranteed to fully represent all subsurface conditions. Contractor shall perform, at his expense, such subsurface exploration, investigation, testing, and analysis as his Designer of Record deems necessary for the design and construction of the foundation system.

A10 1.3.4 - Earthwork

The Designer of Record shall utilize UFGS Specification Section 31 23 00.00 20 "Excavation and Fill" for the project specification.

A10 1.3.5 - Sheet Piles

Provide sheet piles in accordance with the requirements of the Contractor's Geotechnical/ Structural Engineer. See also UFGS Section 02464. For steel sheet piles, provide heavy-gage hot-rolled sheet piling conforming to ASTM A 690 /A 690M or ASTM A 572/A 572M, Grade 50. Provide minimum 0.5 inch wall thickness z-type sheets.

A10 1.3.5.1 - Driving Equipment

Install sheet piles to the required tip elevation with the appropriate equipment as recommended by the Contractor's Geotechnical Engineer.

A10 1.3.5.2 - Installation Tolerances

a. Locate top of sheet piles at cutoff elevation within ½ inch horizontally and 2 inches vertical of the location indicated. Manipulation of the piles is not permitted.

b. A variation of not more than 2 percent from the vertical will be permitted.

A10 1.3.5.3 - Mislocated and Damaged Piles

Remove and replace with new piles those piles that are damaged, mislocated, or installed out of alignment tolerance or provide additional piles, installed as directed by the Contractor's Structural/Geotechnical Engineer, at no additional cost to the Government.

A10 1.3.5.4 - Coated Piles

Handle treated or coated piles so as to protect the treatment or the coating. Repair damage or defects to treatment or coating.

A10 1.3.5.5 - Coatings for Steel Sheet Piles

For steel sheet piles apply a protective coating conforming to SSPC PS 11.01 on both faces of sheet piles from top to 5 feet minimum below ground line or to elevation -10 feet whichever is lower. Paint color shall be black. Apply primer, then two-coat coal tar epoxy-polyamide system with each coat not less than 8 mils dry film thickness. The coating shall also be applied to all backwall steel not fully encapsulated in concrete, including any similar items at deadman anchorages. See also UFGS Section 09 97 13.26.

A10 1.3.5.6 - Coatings for Anchorage System

If the design results in the use of tie rods or other anchorage systems for new sheet pile wall, the exposed elements shall be protected in accordance with UFGS Section 09 97 13.28.

A10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

Comply with the requirements of UFC 1-200-01, “Design: General Building Requirements”, UFC 3-300-10N, "Design: General Structural Requirements", and UFC 3-220-01, “Geotechnical Engineering Procedures for Foundation Design of Buildings and Structures”. When warranted by the project scope, the contractor’s structural engineer of record shall require additional structural tests, inspections, certifications, reports, or observations in addition to those required in the above documents. All quality assurance requirements shall be listed on the structural design drawings.

A10 1.4.1 - Earthwork

Perform quality assurance for earthwork in accordance with IBC Chapter 17 and UFGS Section 31 23 00.00 20. A registered Professional Engineer shall provide inspection of excavations and soil/groundwater conditions throughout construction. The Engineer shall be responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Engineer, with the concurrence of the contractor and the Contracting Officer, shall update the excavation, sheeting, and dewatering plans as construction progresses to reflect actual site conditions and shall submit the updated plan and a written report (with professional stamp) at least monthly informing the Contractor and the Contracting Officer of the status of the plan and an accounting of Contractor adherence to the plan; specifically addressing any present or potential problems. The Engineer shall be available to meet with the Contracting Officer at any time throughout the contract duration. The Contractor shall bear all costs of the Engineer.

A10 1.4.2 - Piles

Perform quality assurance for pile construction in accordance with UFC 1-200-01. Pile installation procedures and installed piles shall be inspected and found to be in compliance with these specifications prior to acceptance of the work.

A10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

A10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-03N, “Design Procedures”, UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” and UFC 3-300-10N, “Design: General Structural Requirements”.

A10 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the

UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

A10 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Reinforcing steel; G

Steel sheet piles; G

Masonry reinforcing steel; G

Anchorage devices embedded in concrete; G

SD-03 Product Data

Materials for curing concrete; G

Joint sealants; G

Joint filler; G

Vapor retarder; G

Epoxy-bonding compound; G

Waterstops; G

Pre-mixed mortar; G

Pile coatings; G

All manufactured products; G

SD-04 Samples

Slab finish sample; G

SD-05 Design Data

Concrete mix design; G

Pile design; G

Calculations; G

SD-06 Test Reports

Cement; G

Fly ash; G

Pozzolan; G

Ground iron blast-furnace slag; G

Aggregates; G

Concrete admixtures; G

Concrete compressive strength tests; G

Masonry unit strength method; G

Masonry prism test; G

Mortar properties; G

Grout; G

Grout strength; G

Mortar strength and properties; G

Field prism test; G

Pile installation records; G

Controlled fill or backfill material tests; G

Special inspection reports; G

SD-07 Certificates

Concrete masonry units; G

SD-11 Closeout Submittals

As-built drawings; G

A1010 STANDARD FOUNDATIONS

A1010 1.1 - FOUNDATION RESTRICTIONS

Do not use timber footing or wood foundations.

A1010 1.2 - TERMITE CONTROL

Provide termiticide in accordance with prescriptive specifications provided elsewhere within this RFP.

A101001 WALL FOUNDATIONS

Provide foundation walls as required in accordance with the requirements of this section and other portions of this RFP.

A101002 COLUMN FOUNDATIONS

Provide column foundations as required in accordance with the requirements of this section and other portions of this RFP.

A1020 SPECIAL FOUNDATIONS

A102001 PILE FOUNDATIONS

Provide steel sheet piles for wall foundations.

A102004 DEWATERING

Dewater site for foundation construction as required by soil conditions and local subsurface waters and surface water, including rainfall. Dewatering requirements and methods shall be established by the Contractor’s Structural/Geotechnical Engineer, based on his subsurface exploration and investigation.

A1030 SLAB ON GRADE

A103001 STANDARD SLAB ON GRADE

Provide standard slab on grade to meet the required loading requirement indicated in accordance with the requirements of this section and other portions of this RFP.

A103003 INCLINED SLAB ON GRADE

Provide inclined slab-on-grade as required in accordance with the requirements of this section and other portions of this RFP.

A103004 TRENCHES

Trenches shall be constructed of reinforced concrete with water proof joints and seals to prevent ground water infiltration.

A103005 PITS AND BASES

Pits and bases shall be constructed of reinforced concrete with water proof joints and seals to prevent ground water infiltration.

-- End of Section --

SECTION B10

SUPERSTRUCTURE
07/04

B10 GENERAL

B10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for the superstructure of the building, including floor and roof framing, columns, and interior load-bearing walls, and the main lateral-force resisting system.

B10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only.
Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

B10 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

B10 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

B10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “Design: General Building Requirements”

UFC 1-300-03N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

ASCE 7-02, “Minimum Design Loads for Buildings and Other Structures”

B10 1.3.1 - Antiterrorism

All work shall comply with UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”.

B10 1.3.2 - Design Parameters

B10 1.3.2.1 - Importance Factors

The Occupancy Category for determining Importance Factors for seismic, snow, and wind design shall be Group II in accordance with Table 1 of UFC 3-310-01.

B10 1.3.2.2 - Wind Exposure

Wind design shall be based on the IBC, ASCE 7-02, and UFC 3-310-01 for a coastal hurricane prone region.

B10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

Comply with the requirements of UFC 1-200-01, “Design: General Building Requirements” and UFC 3-300-10N, “Design: General Structural Requirements”. When warranted by the project scope, the contractor’s structural engineer of record shall require additional structural tests, inspections, certifications, reports, or observations in addition to those required in the above documents. All quality assurance requirements shall be listed on the structural design drawings.

B10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331, “Design Submittal Procedures”, and Section 01332, “Construction Submittal Procedures” for additional requirements.

B10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-03N, “Design Procedures”, UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” and UFC 3-300-10N, “Design: General Structural Requirements”.

B10 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

B10 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Reinforcing Steel; G

Masonry Reinforcing Steel; G

Structural Steel; G

Steel Joists; G

Steel Deck; G

Erection Drawings; G

Structural steel fabrication drawings; G

SD-03 Product Data

Pre-mixed Mortar; G

All manufactured products; G

Coating system for structural steel; G

SD-04 Samples

Pre-cast wall panels: Submit samples for Government review of quality and appearance. See Section B20, “Exterior Enclosure,” for additional requirements.

SD-05 Design Data

Concrete Mix Design; G

Calculations; G

SD-06 Test Reports

Cement; G

Fly ash; G

Pozzolan; G

Ground iron blast-furnace slag; G

Aggregates; G

Admixtures; G

Concrete compressive strength tests; G

Masonry compressive strength - unit strength method; G

Masonry prism test; G

Grout; G

Grout strength; G

Mortar strength and properties; G

Field Prism Test; G

Nuts, bolts, and washers; G

Welding rods; G

Galvanizing: Submit manufacturer's verification inspection documentation in accordance with applicable ASTM for galvanized metal; G

SD-07 Certificates

Welding Procedure and Qualifications; G

Structural Steel; G

AISC Fabricator Certification; G

AISC Erector Certification; G

SD-11 Closeout Submittals

As-built drawings and other information; G

B1010 FLOOR CONSTRUCTION

B101001 STRUCTURAL FRAME

Structural frame elements may include columns, girders, beams, trusses, and/or joists. See Section B20, "Exterior Enclosure," for additional requirements for exterior walls used as load-bearing walls or shearwalls.

B101001 1.1 - FRAMING SYSTEMS

The following structural framing systems shall not be used for this project: masonry piers, cold-formed steel stud walls, wood stud walls, wood columns.

B101001 1.2 - MAIN LATERAL-FORCE RESISTING SYSTEMS

The following main lateral-force resisting systems shall not be used for this project: cold-formed steel stud walls, wood stud walls, masonry wall piers.

B101002 STRUCTURAL INTERIOR WALLS

The following structural interior wall systems shall not be used for this project: cold-formed structural steel studs, wood studs, brick masonry. See Section C10, "Interior Construction" for additional requirements.

B101003 FLOOR DECKS AND SLABS

The following systems shall not be used for this project: non-composite concrete slabs on form deck, wood deck on wood framing, wood deck on light-gage steel framing.

B101004 BALCONY CONSTRUCTION

Design and construct exterior balconies to drain and with the top of the balcony high-point 3/4 inch below the interior floor elevation.

B101005 RAMPS

Provide ramps as required in accordance with the requirements of this section and other portions of this RFP.

B1020 ROOF CONSTRUCTION

B102001 STRUCTURAL FRAME

Structural frame elements may include columns, girders, beams, trusses, and/or joists. See Section B20, “Exterior Enclosure,” for additional requirements for exterior walls used as load-bearing walls or shearwalls.

B102001 1.1 - Framing systems

The following structural framing systems shall not be used for this project: cold-formed steel stud walls, wood stud walls, wood columns.

B102001 1.2 - Main Lateral-Force Resisting Systems

The following main lateral-force resisting systems shall not be used for this project: pre-cast concrete walls, cold-formed steel stud walls, wood stud walls, masonry wall piers, brick masonry, and autoclaved aerated concrete.

B102002 STRUCTURAL INTERIOR WALLS

The following structural interior wall systems shall not be used for this project: cold-formed structural steel studs, wood studs, brick masonry. See Section C10, “Interior Construction,” for additional requirements.

B102003 ROOF DECKS AND SLABS

The following roof decks and framing systems shall not be used for this project: non-composite concrete slabs on form deckprecast concrete slabs, wood deck on wood framing, wood deck on light-gage steel joists, wood deck on light-gage steel trusses.

Standing seam roofing shall not be used as a structural deck.

B102004 CANOPIES

Provide canopies as required in accordance with the requirements of this section and other portions of this RFP.

-- End of Section --

SECTION B20

EXTERIOR ENCLOSURE
2/05

B20 GENERAL

B20 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

THIS SECTION INCLUDES THE REQUIREMENTS FOR THE EXTERIOR ENCLOSURE FOR THE BUILDING, INCLUDING EXTERIOR WALLS, INSULATION, LOUVERS, SCREENS, WINDOWS, GLAZING, AND EXTERIOR DOORS.

B20 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification.

Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

B20 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

Exterior Insulation Manufacturer’s Association (EIMA)

National Lumber Grades Authority (NLGA)

B20 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, Design: General Building Requirements

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

B20 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design”

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-310-01, “Design: Structural Load Data”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”.

All exterior enclosure walls and other enclosure elements shall be designed to resist structural forces resulting from seismic and wind, whether or not the enclosure elements are part of the building structural load-carrying and load-resisting system.

B20 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

B20 1.4.1 - Masonry Appearance

Do not change source or supply of materials after masonry manufacturing work has started. Masonry shall have a uniform appearance when installed. An observable "banding" or "layering" of colors or textures is unacceptable.

B20 1.4.2 - Drawing Requirements for Masonry

Indicate splicing, laps, shapes, dimensions, and details of movement joints, reinforcing steel, and accessories. Include details of anchors, wall ties, positioning devices, bond beams, and lintels. Do not scale drawings to determine lengths of bars.

B20 1.4.3 - Field Samples: Masonry Panel Requirements

At the job site submit for approval by the Contracting Officer, a sample masonry panel approximately 1.2 meters (4 feet) long by 1.2 meters (4 feet) high showing the workmanship, coursing, bond, weep holes, flashing, thickness, anchors, joint reinforcing, wall ties, rigid-board insulation, intersection of walls, bond beams, expansion and control joints, and tooling of joints, range of color, texture of masonry, and mortar color; or cold-formed steel framing, insulation, fiberglass-faced gypsum sheathing, sealant, masonry ties and anchors, and tooling of joints, the range of color and texture of brick veneer, and the color of mortar. The sample panel shall be protected from damage and shall remain at the site until masonry work is complete and approved, at which time the panel shall be removed from the site. Masonry work shall match the approved sample.

B20 1.4.4 - Wall Panel Drawings for Precast Concrete Wall Panels

a. Wall panel dimensions, cross-section, and edge details; location, size, and type of reinforcement, including reinforcement necessary for safe handling and erection of panels. Comply with ACI 315.

b. Layout, dimensions, and identification of each panel, corresponding to installation sequence.

c. Setting drawings, instructions, and directions for installation of concrete inserts.

d. Location and details of anchorage devices and lifting devices embedded in panels, and connection details to building framing system.

B20 1.4.5 - Design Calculations for Precast Concrete Wall Panels

Submit design calculations prepared and sealed by a registered professional engineer demonstrating compliance with indicated loading conditions.

B20 1.4.5.1 - Wind Loads: Provide wind load calculations for exterior cladding in accordance with UFC 1-200-01 and UFC 3-310-01 with comparative analysis of the cladding system to be provided.

B20 1.4.5.2 - Antiterrorism: Provide calculations in accordance with UFC 4-010-01 for minimum antiterrorism standards.

B20 1.4.6 - Connection and Embedment Design Calculations for Precast Concrete Wall Panels

Submit design calculations prepared and sealed by a professional engineer demonstrating compliance with the indicating connection and embedment details.

B20 1.4.7 - Mix Designs for Precast Concrete Wall Panels

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Include a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolan, ground slag, and admixtures; and applicable reference specifications.

B20 1.4.8 - Concrete Wall Panel Surface Finish Sample

Submit a concrete wall panel sample 300 mm (12 inches) by 300 mm (12 inches) by approximately 38 mm (1 1/2 inches) in thickness, to illustrate quality, color, and texture of both exposed-to-view surface finish and finish of panel surfaces that will be concealed by other construction. Obtain approval prior to submission of sample panels.

B20 1.4.9 - Required Records for Precast Concrete Wall Panels

ASTM C 94. Submit mandatory batch ticket information for each load of ready-mixed concrete.

B20 1.4.10 - Manufacturer’s Verification Inspection Documentation

Manufacturer’s verification inspection documentation shall be submitted for galvanized steel in accordance with ASTM A 123, ASTM A 153, and ASTM A 653.

B20 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory exterior enclosure system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

B20 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures”, UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”.

B20 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

B20 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Windows; G

Doors and frames: Provide a schedule of doors and frames and complete details; G

Door hardware schedule; G

Wall louvers; G

Wall flashing; G

Special masonry shapes; G
Reinforcing steel; G

Precast concrete wall panels; G

Movement joints; G

Wall Framing; G

Metal wall panels, include fasteners, supports, flashing, closures; G

Guardrail and railings; G

Screened Equipment Enclosure; G

SD-03 Product Data

Windows; G

Doors and frames; G

Door hardware; G

Wall louvers; G

Movement joints; G

Insulation, Vapor Retarder, Air Barrier, Sealants; G

Wall Framing; G

Metal wall panels; G

Screened equipment enclosures; G

Paints and coatings; G

SD-04 Samples

Exterior wall finishes, including mortar color; G

Exterior glazing materials; G

SD-05 Design Data

Window Pressure Caculations; G

Concrete Mix Design; G

Calculations; G

SD-06 Test Reports

Fly ash; G

Pozzolan; G

Ground iron blast-furnace slag; G

Aggregates; G

Concrete Compressive strength tests; G

Fire rated assemblies; G

Concrete mix design; G

Masonry Strength tests; G

Submit commercial testing results in accordance with PCI MNL-117 and as required in paragraph entitled "Sampling and Testing for Precast."

Concrete Masonry Unit strength method; G

Mortar strength and properties; G

Grout strength; G

Efflorescence test; G

Submit efflorescence test reports on masonry units that are to be exposed to weathering.

Submit manufacturer’s verification inspection documentation in accordance with applicable ASTM for galvanized steel.

SD-07 Certificates

Certificates of grade for all lumber; G

Qualifications of Applicator; G

Concrete products; G

Concrete masonry units; G

SD-08 Manufacturer's Instructions

Installation instructions for the following products:

Windows; G

Doors and frames; G

Precast concrete wall panels; G

Movement joints; G

Metal wall panels; G

Wall louvers; G

Screened equipment enclosure; G

SD-10 Operation and Maintenance Data

Doors and frames: Data Package 1; G

Door hardware schedule: Data Package 1; G

Windows; Data Package 1; G

Rolling service doors and overhead sectional doors: Data Package 3; G

Metal wall panels: Data Package 2; G

Submit Data Package, with wiring diagrams in accordance with Section 01781, “Operation and Maintenance Data.”

B2010 EXTERIOR WALLS

Provide exterior wall construction consisting of exterior skin system of non-structural outside face elements with rain-screen back-up wall systems including; flashing, air barriers, & insulation systems with interior skin system materials to provide protective finish on inside face of exterior walls.

Perform a job specific vapor transmission analysis based on project specific climate and specified wall components and materials. Indicate the temperature and relative humidity for the inside and the outside of the building, a complete listing of building components, their thicknesses, thermal resistance and permeance, as well as building location and use. The analysis shall utilize ASHRAE Handbook Fundamentals, Chapter 23- “Thermal and Moisture Control in Insulated Assemblies” as a minimum. If a mathematical model is used for the analysis, indicate the name of the model and the supplier/developer. The conclusion of the analysis shall indicate the appropriate locations of needed vapor retarders, air barriers, and anticipated dew-point locations in the exterior enclosure during different critical times of the year.

Complete Wall system shall have a minimum insulating value as required by the building code and as required to meet the energy budget for the building. Air infiltration shall not exceed 0.06 cubic feet per minute per square foot of wall area at a test pressure of 30 Kg/m^2 (6.24 psf) (80 kph (50 mph wind)) when tested in accordance with ASTM E 283. No water penetration shall occur at a pressure of 39 Kg/m^2 (8 psf) of fixed area when tested in accordance with ASTM E 331.

All work shall comply with UFC 3-100-10N, "Design: General Architectural and Interior Design Requirements", and UFC 3-300-10N, "Design: General Structural Requirements"

B201001 EXTERIOR SKIN

B201001 1.1 - MASONRY VENEER EXTERIOR WALL SKIN

Masonry veneer shall include load bearing and non-load bearing exterior walls of the structure, and shall include colored mortar, special shapes such as sills, headers, trim units and copings of concrete masonry, precast concrete, or other approved material. The veneer shall be tied to the backup wall system with a system that allows the veneer to move independently of the backup wall system, while being structurally supported. The masonry veneer shall allow for expansion and contraction of the veneer without cracking the exterior material.

B201001 1.1.1 - Split Faced Masonry

ASTM C 90. Provide spit faced units, or split-ribbed units or scored-faced units as required. Provide special shapes as required. Use running bond, tooled concave joints and provide full head joint weeps at 610 mm (24 inches) o.c. along the base course. Use sloped rowlocks that project not less than 13mm (1/2 inch) beyond the face of the wall to form a wash and drip. Provide water repellent admixture to split-faced masonry units and mortar where the exterior face of the units will not receive a waterproof coating such as paint. Provide type S colored mortar conforming to ASTM C270. Seal expansion/control joints with ASTM C 920 polyurethane sealant to match color of the masonry. Conform to ACI 530.1 for installation, including cold weather construction. Clean the masonry in accordance with manufacturer's instructions.

B201001 1.1.2 - Cast Stone Trim Units

Cast stone shall be the product of a manufacturer regularly engaged in the manufacture of cast stone (precast concrete) products. Any producer member of the Cast Stone Institute shall be an acceptable manufacturer. Provide trim units of cast stone to include sills, fascia, header units, copings and other trim units as required by the approved design. Aggregates shall meet ASTM C33, except that gradation may vary to achieve the desire appearance. Products shall otherwise conform to the paragraph of this section titled, “Precast Concrete Wall Panels.” Setting of cast stone units shall be in accordance with approved shop drawings. Repair of chipped units shall be by a method approved by the manufacturer.

B201001 1.1.3 - Air Space

All cavity/veneer walls shall have a minimum 25 mm (1 inch) actual dimension air space, not including insulation space. Take precautions to preclude insulation from reducing this minimum requirement by showing an R-value and a maximum rigid insulation thickness on the drawings. Distances between wythes shall not exceed 100 mm (4 inches) unless a detailed wall tie analysis is performed. The exception to this requirement is that for seismic design, the maximum space between wythes

for veneer walls is 50 mm (2 inches) including insulation space. Air space shall remain free and be cleared of all debris, including mortar.

B201001 1.1.4 - Through Wall Flashing

B201001 1.1.4.1 - Through-wall flashing shall be incorporated in cavity wall construction at appropriate locations that include, but are not limited to, grade level, at floor elevations, above windows and doors and at other openings in the wall face, under sills, at tray flashings, at decorative masonry caps and recesses, and at step flashings.

B201001 1.1.4.2 - Provide bituminous coated copper through-wall flashing material. Coated-copper shall be 7 ounce copper with a 3 ounce bituminous coating on each side. Sixteen (16) ounce uncoated copper, 28 gauge Type 302 or 304 stainless steel are also acceptable. Flexible membrane flashing, plastic or PVC-based membrane flashing is prohibited.

B201001 1.1.4.3 - Provide end dams of minimum 25 mm (1 inch) vertical height at all through-wall flashing terminations. Provide flashing at corners with minimum 150 mm (6 inch) overlap, sealed and conforming to the shape of the structure. Flashing shall extend to the exterior surface of the wall. Flashing shall extend 6 mm (1/4 inch) beyond the wall plane and turn down at a 45 degree angle to form a drip whenever possible. Separate dissimilar metals of flashing, shelf angles, and lintels to prevent galvanic action.

B201001 1.1.4.4 - Weep Holes: Provide open head joint weep hole spacing shall not exceed 16 inches on center. Wind and insect screens, or baffles, shall be provided for open head joint weeps. Weep holes shall be formed as masonry units are laid. Drilling weeps after mortar placement is not acceptable."

B201001 1.1.5 - Reinforcing in Veneer Layer: Reinforcing in the veneer layer shall be galvanized in accordance with ASTM A 123/A123M, ASTM A153/A153M, or ASTM A653/A653M, Z275 (G90) coating, and be of sufficient size to eliminate damage to the veneer layer from wind and other live and dead loads imposed on the veneer layer.

B201001 1.2 - METAL WALL PANEL EXTERIOR SKIN

B201001 1.2.1 - Steel Wall Panels

Wall system and attachments shall resist wind loads as determined by ASCE 7, with a factor of safety appropriate for the material holding the anchor. Maximum deflection due to wind on wall panels and girts shall be limited to 1/120 of their respective spans except that when interior finishes are used the maximum allowable deflection shall be limited to 1/180 of their respective spans. The structural performance test methods and requirements of the wall system and attachments shall be in accordance with ASTM E 1592.

Wall panels shall have configurations for overlapping adjacent sheets or interlocking ribs for securing adjacent sheets and shall be fastened to framework using concealed fasteners. Length of sheets shall be sufficient to cover the entire height of any unbroken wall surface when the length of run is 9 meters (30 feet) or less. Design provisions shall be made for expansion and contraction. Provide series 305 stainless steel fasteners factory finished to match panels.

B201001 1.2.1.1 - Shape

Standard V-beam or boxed beam type having 125 mm to 200 mm (5 to 8 inch) pitch and 38 mm (1.5 inch), minimum, overall depth, exclusive

of coating. Other shapes may be considered as approved by the Contracting Officer.

B201001 1.2.1.2 - Material and Coating

Form sheets from steel conforming to ASTM A 653/A 653M, Structural Grade 40, galvanized coating conforming to ASTM A 924/A 924M, Class G-90; aluminum-coated steel conforming to SAE AMS 5036; or steel-coated with aluminum-zinc alloy conforming to ASTM A 792/A 792M, except that coating chemical composition shall be approximately 55 percent aluminum, 1.6 percent silicon, and 43.4 percent zinc with minimum coating weight of 0.5 ounce per square foot.

B201001 1.2.1.3 - Gage

Minimum 22 U.S. Standard Gage for wall panels, but in no case lighter than required to meet maximum deflection requirements specified.

B201001 1.2.1.4 - Factory Color Finish

Provide factory applied, baked coating to the exterior and interior of metal wall panels and metal accessories. Provide exterior finish top coat of 70 percent polyvinylidene fluoride resin with not less than 0.8 mil dry film thickness. Provide exterior primer standard with panel manufacturer with not less than 0.8 mil dry film thickness. Interior finish shall consist of 0.5 mil dry film thick backer coat or the same coating and dry film thickness as the exterior coating if the panel interior side will be exposed. Provide factory-applied clear 70 percent PVF topcoat and edge coating of not less than 0.8 mil on all factory-cut or unfinished panel edges for projects within 91 meters (300 feet) of the ocean or industrial environments.

B201001 1.2.2 - Aluminum Wall Panels

Wall system and attachments shall resist wind loads as determined by ASCE 7, with a factor of safety appropriate for the material holding the anchor. Maximum deflection due to wind on wall panels shall be 1/60 and girts shall be limited to 1/120 of their respective spans except that when interior finishes are used the maximum allowable deflection shall be limited to 1/180 of their respective spans. The structural performance test methods and requirements of the wall system and attachments shall be in accordance with ASTM E 1592.

B201001 1.2.2.1 - Shape

Standard V-beam or box-beam type having 100 mm to 200 mm (4 to 8 inch) pitch and 38 mm (1.50 inch), minimum, overall depth exclusive of coating. Other shapes may be considered as approved by the Contracting Officer.

B201001 1.2.2.2 - Material and Coating

Form sheets of Alloy 3004 or Alclad 3004 conforming to ASTM B 209 having proper temper to suit respective forming operations.

B201001 1.2.2.3 - Thickness

Minimum 0.81 mm (0.032 inch) nominal, but in no case thinner than that required to meet maximum deflection requirements specified.

B201001 1.2.2.4 - Factory Color Finish

Provide factory applied, baked coating to the exterior and interior of metal wall panels and metal accessories. Provide exterior finish top coat of 70 percent polyvinylidene fluoride resin with not less than 0.8 mil dry film thickness. Provide exterior primer standard with panel manufacturer with not less than 0.8 mil dry film thickness. Interior finish shall consist of 0.5 mil dry film thick backer coat or the same coating and dry film thickness as the exterior coating if the panel interior side will be exposed. Provide factory-applied clear 70 percent PVF topcoat and edge coating of not less than 0.8 mil on all factory-cut or unfinished panel edges for projects within 91 meters (300 feet) of the ocean or industrial environments.

B201001 1.2.3 - Insulated Aluminum Or Steel Wall Panels

Insulated wall panels shall be steel or aluminum factory-fabricated units with insulating core between metal face sheets, securely fastened together and uniformly separated with rigid spacers. Panels shall have a factory color finish. Insulation shall be compatible with adjoining materials and capable of retaining its R-value for the life of the metal facing sheets; and unaffected by extremes of temperature and humidity. The assembly shall have a flame spread rating not higher than 25, and smoke developed rating not higher than 50 when tested in accordance with ASTM E 84. Panels shall be not less than 200 mm (8 inches) wide and shall be in one piece for unbroken wall heights.

Wall panels shall have edge configurations with interlocking ribs for securing adjacent panels. Provide factory fabricated corners and trim pieces at intersections with other materials. Wall panels shall be fastened to framework using concealed fasteners. Installation shall be in accordance with approved shop drawings and manufacturer’s recommendations.

B201001 1.2.3.1 - Steel Panels

Zinc-coated steel conforming to ASTM A 653/A 653M; or Aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 55 coating. Uncoated wall panels shall be 0.61 mm (0.024 inch) thick minimum.

B201001 1.2.3.2 - Aluminum Panels

Alloy conforming to ASTM B 209, temper as required for the forming operation, minimum 0.81 mm (0.032 inch) thick.

B201001 1.2.3.3 - Factory Color Finish

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. The exterior coating shall be a nominal 2 mil thickness consisting of a topcoat of not less than 0.8 mil dry film thickness and the paint manufacturer's recommended primer of not less than 1.0 mil thickness. The interior color finish shall consist of the same coating and dry film thickness as the exterior if the interior of the panel will be exposed, or a nominal a backer coat with a dry film thickness of 0.5 mil. Provide factory-applied clear 70 percent PVF topcoat and edge coating of not less than 0.8 mil on all factory-cut or unfinished panel edges for projects within 91 meters (300 feet) of the ocean or industrial environments.

B201001 1.3 - STUCCO EXTERIOR WALL SKIN

B201001 1.3.1 - Portland Cement Plaster: ASTM C 150, gray Portland cement Type II with 13 mm (1/2 inch) maximum chopped alkali resistant

fiberglass strands, minimum 1.5 percent by weight to cement; .68 kg (1 1/2 pounds) per sack of cement. Lime shall conform to ASTM C 206, Type S. Provide stainless steel or zinc corner beads, J-beads and other accessories.

a. Provide acrylic admixture or coating to give additional moisture suppression to control fungus growth.

b. Sand for Portland Cement Stucco ASTM C 144, except gradation of sand shall conform to the following requirements:

c. Sand Gradation for Basecoats:

Percentage Retained by weight (plus or minus 2 percent) on each sieve

Sieve Size	Min.	Max.
No. 4	0	0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100

d. Sand for Finish Coats: Natural color and graded within the limits shown above for basecoats, except that the sand shall pass the No. 8 sieve, and for smooth finish the sand shall pass the No. 30 sieve.

e. Mix scratch coat in proportion of one part by volume Portland cement, 3/4 to 1 1/2 parts by volume hydrated lime and 2 1/2 to 4 parts sand (volume of sand per sum of cement and lime). Mix brown coat in proportion of one part by volume Portland cement, 3/4 to 1 1/2 parts by volume hydrated lime and 3 to 5 parts sand (volume of sand per sum of cement and lime). Mix proportions can vary depending on climate and application variations, with the approval of the Contracting Officer.

f. Portland Cement Stucco Finish Coat 3 to 5 parts sand (volume of sand per sum of cement and lime).

g. Portland cement plaster application shall be in accordance with ASTM C 926. Furring and lath application shall be in accordance with ASTM C 1063.

h. Bonding Agents: ASTM C 932. Provide for exterior applications to masonry or concrete substrates.

B201001 1.4 - EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

Use of Exterior Insulation and Finish System is not permitted on this project.

B201001 1.5 - CONCRETE EXTERIOR WALL SKIN

B201001 1.5.1 - Precast Concrete Wall Panels:

ACI 211.1 and ACI 301. PCI MNL-116 or PCI MNL-117. Concrete shall have a minimum 28-day compressive strength of 281 Kg/cm^2 (4000 psi). Air content of plastic concrete shall be between 4 and 6 percent air by volume. Provide a dosage of air entraining agent, which will produce 19 plus or minus 3 percent air in a 1 to 4 by weight standard sand mortar in accordance ASTM C 185. Provide aggregate in accordance with ASTM C 33. Design for watertight joints, or weeping joints having back-up water

penetration protection in precast elements. Cracking potential of precast concrete elements shall be minimized by implementing expansion and control joints in the precast assembly.

Joints shall include properly sized and placed backing material and fully loaded and tooled sealant joint of no less than 1/4 inch sealant material thickness.

B201001 1.5.1.1 - Exposed Aggregates
In addition to the above aggregate, facing mixture aggregate, and aggregate for homogeneous panels with exposed aggregate finish, shall be crushed stone.

B201001 1.5.1.2 - Cement

ASTM C 150.

B201001 1.5.1.3 - Admixtures

ASTM C 260 for air-entraining admixtures. Other admixtures: ASTM C 494. Certify that admixtures are free of chlorides.

B201001 1.5.1.4 - Water

Fresh, clean, and potable.

B201001 1.5.1.5 - Reinforcement

ACI 301.

B201001 1.5.1.6 - Inserts

ASTM A 47, Grade 32510 or 35018, or may be medium strength cast steel conforming to ASTM A 27/A 27M, Grade U-60-30. Where exposed to moisture, provide inserts hot-dip galvanized after fabrication in accordance with ASTM A 153/A 153M.

B201001 1.5.1.7 - Embedded Plates

ASTM A 36/A 36.

B201001 1.5.1.8 - Flashing Reglets

Fabricate of sheet metal, open-type with continuous groove 28 mm (1 1/8 inches) deep minimum by 5 mm (3/16 inch) wide at opening and sloped upward at 45 degrees. Top surface shall have toothed lip section to anchor upturned edge of metal snap-lock counter flashing when inserted. Sheet metal shall be stainless steel, 0.28 mm (0.011 inch) minimum thickness, ASTM A 167, Type 302 or Type 304, Number 2D finish, soft temper.

B201001 1.5.1.9 - Clip Angles

ASTM A 36/A 36M steel, galvanized after fabrication in accordance with ASTM A 153/A 153M.

B201001 1.5.1.10 - Ferrous Casting Clamps

ASTM A 47, Grade 32510 or Grade 35018 malleable iron or cast steel, or ASTM A 27/A 27M, Grade U-60-30, cast steel casting, hot-dip galvanized in accordance with ASTM A 153/A 153M.

B201001 1.5.1.11 - Threaded Fasteners

Provide galvanized machine bolts, washers and, when required, nuts.

a. Bolts: ASTM A 449, 19 mm (3/4 inch) diameter machine bolts with hexagon head.

b. Washers: ANSI B18.21.1, medium or heavy lock-spring washers.

c. Nuts: ASTM A 563, Grade C, heavy, hexagon-type nuts.

d. Square Nuts: ASTM A 563, Grade A, plain, square-type nuts where required for slotted-type concrete inserts.

B201001 1.5.1.12 - Form Materials

Provide forms and form-facing materials of wood, metal, plastic, or other approved material to produce concrete having the specified finish.

B201001 1.5.1.13 - Sampling And Testing for Precast

B201001 1.5.1.13.1 - Product Quality Control

PCI MNL-117 for PCI enrolled plants. Where panels are manufactured by specialists in plants not currently enrolled in the PCI "Quality Control Program," provide a product quality control system in accordance with PCI MNL-117 and perform concrete and aggregate quality control testing using an approved, independent commercial testing laboratory. Submit test results to the Contracting Officer.

a. Aggregate Tests: ASTM C 33. Perform one test for each aggregate size, including determination of the specific gravity.

b. Strength Tests: ASTM C 172. Provide ASTM C 39 and ASTM C 31/C 31M compression tests. Perform ASTM C 143 slump tests. Mold six cylinders each day or for every 15 cubic meters (20 cubic yards) of concrete placed, whichever is greater. Perform strength tests using two cylinders at 7 days and two at 28 days. Cure four cylinders in the same manner as the panels and place at the point where the poorest curing conditions are offered. Moist cure two cylinders and test at 28 days.

c. Changes in Proportions: If, the compressive strength falls below that specified, adjust the mix proportions and water content and make necessary changes in the temperature, moisture, and curing procedures to secure the specified strength. Notify the Contracting Officer of all changes.

d. Strength Test Results: Evaluate compression test results at 28 days in accordance with ACI 214 using a coefficient of variation of 20 percent. Evaluate the strength of concrete by averaging the test results (two specimens) of standard cylinders tested at 28 days. Not more than 20 percent of the individual tests shall have an average compressive strength less than the specified ultimate compressive strength.

B201001 1.5.1.13.2 - Rejection

Panels in place may be rejected for any one of the following product defects or installation deficiencies remaining after repairs and cleaning have been accomplished. "Visible" means visible to a person with normal eyesight when viewed from a distance of 6 meters (20 feet) in broad daylight.

a. Nonconformance to specified tolerances.
b. Air voids (bugholes or blowholes) larger than 9 mm (3/8 inch) diameter.
c. Visible casting lines.
d. Visible from joints.
e. Visible irregularities.
f. Visible stains on panel surfaces.
g. Visible differences between panel and approved sample.
h. Visible nonuniformity of textures or color.
i. Visible areas of backup concrete bleeding through the facing concrete.
j. Visible foreign material embedded in the face.
k. Visible repairs.
l. Visible reinforcement shadow lines.
m. Visible cracks.
n. Structural deficiencies.

B201001 1.5.1.13.3 - Field Quality Control

Perform field inspection of panel connections. The Contracting Officer shall be notified in writing of defective welds, bolts, nuts and washers within 7 working days of the date of inspection. All defective connections or welds shall be removed and re-welded or repaired as required by the Contracting Officer.

a. Welded Connection Visual Inspection: AWS D1.1, furnish the services of AWS-certified welding inspector for erection inspections. Welding inspector shall visually inspect all welds and identify all defective welds.

B201001 1.5.2 - Cast-In-Place/Tilt-Up Concrete Wall Panels:

ACI 211.1, ACI 301/301M, and ACI 318/318M and ACI 304.2R except as otherwise specified. The compressive strength (f'c) of the concrete for each portion of the structure(s) shall be in accordance with the code.

Design for watertight joints, or weeping joints having back-up water penetration protection in precast elements. Cracking potential of precast concrete elements shall be minimized by implementing expansion and control joints in the precast assembly.

Joints shall include properly sized and placed backing material and fully loaded and tooled sealant joint of no less than 1/4 inch sealant material thickness.

B201001 1.5.2.1 - Cement

ASTM C 150, or ASTM C 595.

B201001 1.5.2.2 - Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

B201001 1.5.2.3 - Aggregates

ASTM C 33. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance that may be deleteriously reactive with the alkalies in the cement.

B201001 1.5.2.4 - Air-Entraining

ASTM C 260. Use for concrete exposed to freeze-thaw conditions.

B201001 1.5.2.5 - Reinforcing Bars

ACI 301/301M unless otherwise specified.

B201001 1.5.2.6 - Field Quality Control

a. Sampling: ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

b. Slump Tests: ASTM C 143/C 143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 15 cubic meters (20 cubic yards) maximum of concrete.

c. Temperature Tests: Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 10 degrees C (50 degrees F) and above 32 degrees C (90 degrees F)) for each batch (minimum) or every 15 cubic meters (20 cubic yards) (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

d. Compressive Strength Tests: ASTM C 39. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each building element of concrete placed each day shall be taken not less than once a day, nor less than once for each 76 cubic meters (100 cubic yards) of concrete, nor less than once for each 465 square meters (5000 square feet) of surface area for walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 3447 kPa (500 psi), take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

B201001 1.6 - OTHER EXTERIOR WALL SKIN

B201001 1.6.1 - Concrete Unit Masonry

Load-bearing units: ASTM C90, Non-load bearing- units: ASTM C129, Type I or II. Provide ground face units, split-faced units or split-ribbed units for exposed exterior walls. Provide water repellent admixture to split-faced masonry units where the exterior face of the units will not receive a waterproof coating such as paint. Mortar shall conform to

ASTM C 270, Type S. Test mortar in accordance with ASTM C 780. Provide water repellent admixture and color additive in mortar for masonry walls that will not receive a waterproof coating such as paint. Do not use admixtures containing chlorides. Provide air entrainment, not to exceed 12 percent, in mortar. Water for mixing shall be potable.

B201001 1.6.1.1 - Grout

ASTM C 476, and ACI 530.1. Slump between 200 mm and 275 mm (8 and 11 inches). Provide minimum grout strength of 140 Kg/cm^2 (2000 psi) in 28 days, as tested by ASTM C 1019.

B201001 1.6.1.2 - Ready Mixed Grout

ASTM C 94.

B201001 1.6.1.3 - Anchors, Ties

Stainless steel, ASTM A 167 Type 304 or zinc-coated steel, galvanized after fabrication ASTM A 153/A 153M. For completely embedded wire, ASTM A 641/A 641M, Class 1 or 3. Sheet metal ties completely embedded in mortar, ASTM A 653/A 653M, class G60. Do not use corrugated wall ties.

B201001 1.6.1.4 - Horizontal Joint Reinforcement and Wire Reinforcement

Fabricate from cold drawn steel wire, ASTM A 82. Hot-dip galvanize after fabrication, ASTM A 153/A 153M, B-2. Provide ACI 530.1 truss type reinforcement with two or more longitudinal wires welded to continuous diagonal cross wire, or ladder type with perpendicular cross wires not more than 400 mm (16 inches) o.c.

B201001 1.6.1.5 - Adjustable Anchors for Structural Members

Use adjustable anchors to anchor masonry structural steel columns or beams. Weld the fixed portion of the anchors (steel anchor rods) to the structural steel member. Provide adjustable anchors 5 mm (3/16 inch) diameter steel wire, triangular-shaped. Anchors attached to steel shall be 8 mm (5/16 inch) diameter steel bars placed to provide 1.6 mm (1/16 inch) play between flexible anchors and structural steel members.

B201001 1.6.1.6 - Deformed Bars

ASTM A 615/A 615M, ASTM A 616/A 616M, ASTM A 617/A 617M, or ASTM A 706/A 706M. Provide galvanized or epoxy coated reinforcing where reinforcing will be exposed to moisture.

B201001 1.7 - WALL BACKUP SYSTEMS FOR VENEERS

Provide Exterior Wall Construction System (back-up systems for wall veneer) including cast-in-place concrete, pre-cast concrete, unit masonry wall systems with insulation as described below:

B201001 1.7.1 - Concrete Unit Masonry

a. Provide hollow load-bearing units: ASTM C90; non-load bearing-units: ASTM C129, Type I or II. Where fire-rated assemblies are required, provide units that have been tested in conformance with ASTM E 119.

b. Provide load-bearing units for exterior walls, foundation walls, load-bearing walls, and shear walls. Seal expansion and control joints with elastomeric sealant conforming to ASTM C 920, type

S, color to match adjacent finish. Clean the block in accordance with manufacturer's instructions.

c. Do not use composite masonry walls; i.e. two wythes of masonry units in which the collar joint between is filled solidly with grout, unless written approval are obtained. If approved, vertical reinforcing will not normally be allowed within the collar joint. Grouting shall comply with ACI 530.1.

d. Mortar shall conform to ASTM C 270, Type S. Test in accordance with ASTM C 780. Conform to ACI 530.1 for installation, including cold weather construction. Clean the masonry in accordance with manufacturer's instructions.

B201001 1.7.1.1 - Horizontal Joint Reinforcement and Wire Reinforcement

Fabricate from cold drawn steel wire, ASTM A 82. Hot-dip galvanize after fabrication, ASTM A 153/A 153M, B-2. Provide ACI 530.1 truss type reinforcement with two or more longitudinal wires welded to continuous diagonal cross wire, or ladder type with perpendicular cross wires not more than 400 mm (16 inches) o.c.

B201001 1.7.1.2 - Adjustable Anchors for Structural Members

Use adjustable anchors to anchor masonry structural steel columns or beams. Weld the fixed portion of the anchors (steel anchor rods) to the structural steel member. Provide adjustable anchors 5 mm (3/16 inch) diameter steel wire, triangular-shaped. Anchors attached to steel shall be 8 mm (5/16 inch) diameter steel bars placed to provide 1.6 mm (1/16 inch) play between flexible anchors and structural steel members.

B201001 1.7.1.3 - Deformed Bars

ASTM A 615/A 615M, ASTM A 616/A 616M, ASTM A 617/A 617M, or ASTM A 706/A 706M. Provide galvanized or epoxy coated reinforcing where reinforcing will be exposed to moisture.

B201001 1.7.1.4 - Veneer ties

Stainless steel, ASTM A 167 Type 304 or zinc-coated steel, galvanized after fabrication ASTM A 153/A 153M. For completely embedded wire, ASTM A 641/A 641M, Class 1 or 3. Sheet metal ties completely embedded in mortar, ASTM A 653/A 653M, class G60. Provide vertically adjustable wall ties. Do not use corrugated wall ties.

B201001 1.7.2 - Cast-in-place Concrete System

Cast-in-place concrete system shall be in accordance with paragraph in this section titled, “Cast-In-Place/Tilt-Up Concrete Wall Panels”.

B201001 1.7.3 - Precast Concrete System

Precast concrete system shall be in accordance with paragraph in this section titled, “Precast Concrete Wall Panels”.

B201001 1.8 - SEALANT JOINTS

B201001 1.8.1 - Sealant joint design and application shall be in accordance with the general requirements of “Sealants: A Professionals’ Guide” from the Sealant, Waterproofing & Restoration Institute. All sealant shall conform to ASTM C 920.

B201001 1.8.2 - Joints shall include proper backing material for sealant support during application, control of sealant depth, and to act as a bond breaker. Filler boards, backer rods and bond breaker tapes shall be used. Backer rods should typically be of diameter 1.5 times the width of the joint opening, properly placed within the joint, and fully loaded and tooled sealant joint of no less than 6 mm (1/4 inch) sealant material thickness, and equal to joint width for joints up to 13 mm (1/2 inch) wide, 1/2 joint width for joints 13 mm (1/2 inch) wide and wider but no more than 13 mm (1/2 inch) thickness.

B201001 1.8.3 - Sealant application to concrete and masonry materials typically requires priming of the contact surfaces of the masonry prior to sealant application. Priming shall only be omitted when specifically not recommended by the sealant manufacturer.

B201001 1.8.4 - Applied sealant shall be tooled to compact the sealant and promote adhesion to joint walls and provide for finished appearance. Tooling shall not compact sealant too less than the minimum sealant thickness required. Mask adjacent surfaces to control sealant boundaries during sealant application.

B201002 INSULATION & VAPOR RETARDERS

Provide Insulation, Vapor Retarders, and Air Barrier Systems in and on Exterior Enclosure to include; insulation, liquid, sheet or continuous film materials installed separately in and on wall assemblies to provide resistance to heat loss/gain, and vapor penetration.

B201002 1.1 - VAPOR RETARDERS

Comply with ASTM C755. Incorporate in the exterior wall system where required by vapor transmission calculations or dew point analysis indicates the need or in conditions of high moisture exposure.

B201002 1.1.1 - Bituminous Dampproofing

ASTM D449, Type I or Type II. Provide bituminous dampproofing on the exterior surface of the interior wythe of masonry in a cavity wall (back-up wall for masonry veneer).

B201002 1.2 - INSULATION SYSTEMS

Provide vertical and horizontal polystyrene insulation conforming to ASTM C578 or rigid polyisocyanurate board wall insulating products conforming to ASTM C591 or mineral-fiber blanket insulation conforming to ASTM C 665. Wall insulating product shall have a minimum R-value to meet the code and the energy design of the facility. Seal the joints in rigid insulation within cavity/veneer walls for additional moisture protection.

B201003 INTERIOR SKIN

Interior Skin materials shall provide a protective finish on inside face of exterior walls and shall include: paint, plaster, gypsum board, ceramic tile, and special coating to walls.

Provide interior skin in accordance with Section C30, “INTERIOR FINISHES”.

B201005 EXTERIOR LOUVERS & SCREENS

Provide louvers, which are not an integral part of the mechanical equipment, exterior closures, grilles and screens, and other materials used for a variety of purposes including screening of equipment.

Provide louvers, screens, grilles in a color and design that is compatible with the fabric of the exterior architectural character as described below. For frame construction, install in accordance with ASTM E 2112.

B201005 1.1 - WALL LOUVERS

Typically provide drainable blade type louver with blade slopes of 45 degrees minimum, but provide a wind driven rain rated louvers for wall louvered rooms without a floor drain within the room. Provide louvers made to withstand a wind load of not less than 146 Kg/m^2 (30 psf), 2mm (.08 inch) thick 6063-T5 or T52 extruded aluminum in a factory-finished color in accordance with AAMA 2605 with a minimum coating thickness of 1.2 mil to match the building facade. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500, 500L (wind driven rain), and AMCA 511. Provide sill flashing with sloped drain pan at base of louver to collect moisture that migrates down the interior face of the louver. This sill flashing shall drain water to the outside of the building. Provide bird screens.

B201005 1.2 - SCREENED EQUIPMENT ENCLOSURE

Fabricate of vertical steel or aluminum channel support frames anchored securely in place. Provide secondary horizontal steel or aluminum framing for attachment of screen materials. Screen material shall be factory finished coating in accordance with AAMA 2605 with a minimum coating thickness of 1.2 mils. Formed metal panels from galvanized steel sheet per ASTM A 653 or aluminum sheet per ASTM B 209.

B201006 SUN CONTROL DEVICES (EXTERIOR)

Provide manufactured devices to provide sun control, and privacy on exterior windows and storefronts. Devices for openings shall be fixed style. Sun control devices shall be designed and installed to withstand the wind loads prevailing at the project site.

B201006 1.1 - EXTERIOR SUN SCREENS

Provide exterior sunscreen of aluminum with 6063-T5/T6 aluminum demountable frame attachment. Screen material shall be formed factory finished metal from aluminum sheet per ASTM B 209. Screen material shall be factory finished coating in accordance with AAMA 2605 with a minimum coating thickness of 1.2 mils. Sunscreen shall be fin type.

B201007 BALCONY WALLS & HANDRAILS

Provide complete metal balcony walls and non-corrosive metal railing systems including anchors and attachment sleeves and fasteners.

B201007 1.4 - HANDRAILS

Design handrails and anchorage connections to resist loads in accordance with IBC. NAAMM PR, provide the same size rail and post. Provide series 300 stainless steel pipe collars. Factory coat all metal railings, except ornamental metals such as brass, bronze, and nickel-silver, with a high performance coating in accordance with AAMA 2605 with a minimum coating thickness of 1.2 mils unless otherwise noted.

B201007 1.4.1 - Steel Handrails

Provide steel handrails, including inserts in concrete, steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Provide steel railings of 38 mm (1 1/2 inches) nominal size. Railings shall be hot-dip galvanized, primed and shop painted for interior and exterior applications.

B201007 1.4.2 - Aluminum Handrails

Provide aluminum railing of 38 mm (1 1/2 inch) nominal schedule 40 pipe conforming to ASTM B 429 or 44 mm (1 3/4 inch) square aluminum semi-hollow tube with rounded corners conforming to ASTM B 221. Railings shall be coated with a high performance coating or anodized in accordance with AAMA 611, Class I. All fasteners shall be Series 300 stainless steel.

B201008 EXTERIOR SOFFITS

Provide exterior soffit system assemblies, trim and accessories including high performance coatings. Installation shall be crisp, fit and trim with tight joinery to back-up framing. Use adequate backing material to assure snug joints and even face planes. Where soffits ventilate an attic space, or an otherwise unventilated space, provide adequate ventilation.

B201008 1.1 - METAL SOFFIT PANELS

Provide factory-formed and factory-finished metal soffit panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching through panels to galvanized non-load bearing framing conforming to ASTM A 653 (G60) and ASTM C 645, using concealed fasteners and factory-applied sealant in side laps. Provide trim accessories of the same material and finish as the soffit material where soffit abuts other materials.

B201009 SCREEN WALL

Screen walls include attached or unattached walls adjacent to the main building. Screen walls shall conform to the applicable portions of Section B201001 EXTERIOR SKIN.

B201010 EXTERIOR COATINGS

B201010 1.1 – GENERAL REQUIREMENTS

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates.

All paint shall be in accordance with the Master Painter Institute (MPI) standards for the exterior architectural surface being finished. The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a more current MPI "Approved Product List", however, only one list may be used for the entire contract. All coats on a particular substrate, or a paint system, must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable. If the RFP does not identify a paint system applicable to all painting of the facility, utilize the MPI “Architectural Painting, Exterior System” manual to identify appropriate paint coatings. Utilize the “Premium Grade” systems and comply with all limitations stated in the MPI “Approved Products List” for each system.

Remove dirt, splinters, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in

contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

B201010 1.1.1 - MPI Gloss Levels

MPI system of defining gloss: Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6. Gloss is tested in accordance with ASTM D 523. Use G3 Eggshell in high traffic areas for ceilings and walls, when a surface can be touched and a slightly more durable finish is desired and for dark accent colors. Use G5 Semigloss for ceilings, walls, doors and trim for high durability and cleanability. Use G6 Gloss only in special situations such as for piping identification or special effects.

B201010 1.1.2 - MPI System Number

The MPI coating system number is found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior system (EXT/REX).

B201010 1.1.3 - MPI Designations

B201010 1.1.3.1 - EXT is the MPI short-term designation for an exterior coating system.

B201010 1.1.3.2 - DSD is the MPI short-term designation for Degree of Surface Degradation as defined in the Assessment sections in the MPI Maintenance Repainting Manual.

B201010 1.1.3.3 - REX is the MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

B201010 1.1.4 - Surface Preparation

Comply with the MPI “Architectural Painting, Exterior Surface Preparation” Manual, except all suggestive language shall be deleted and directive language substituted in its place. All suggestive language such as “may”, “must”, and “should” are deleted from the standard and “shall” inserted in its place. Suggestive language such as “recommended” or “advisable” are deleted from the standard and “require” or “required” inserted in its place. The results of these wording substitutions change this document to required procedures.

B201010 1.2 - PAINTED FINISHES TO EXTERIOR CONCRETE SURFACES

B201010 1.2.1 - New concrete; vertical surfaces, undersides of balconies and soffits, but excluding tops of slabs:

B201010 1.2.1.1 - Latex, System DFT: 3.5 mils

a. New; MPI EXT 3.1A-G2 (Flat)/Existing; MPI REX 3.1A-G2 (Flat); Primer: MPI 10, Intermediate: MPI 10, Topcoat: MPI 10

b. New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI REX 3.1A-G5 (Semigloss); Primer: MPI 11, Intermediate: MPI 11, Topcoat: MPI 11

B201010 1.3 - PAINTED FINISHES TO EXTERIOR CONCRETE MASONRY SURFACES

B201010 1.3.1 - New concrete masonry:

B201010 1.3.1.1 - Latex, System DFT: 11 mils

a. New; MPI EXT 4.2A-G1 (Flat)/Existing; MPI REX 4.2A-G1 (Flat); Block filler: MPI 4, Primer: N/A, Intermediate: MPI 10, Topcoat: MPI 10

b. New; MPI EXT 4.2A-G5 (Semigloss) / Existing; MPI REX 4.2-G5 (Semigloss); Block filler: MPI 4, Primer: N/A, Intermediate: MPI 11, Topcoat: MPI 11

B201010 1.4 - PAINTED FINISHES TO EXTERIOR METAL SURFACES

B201010 1.4.1 - New Steel that has been blast cleaned to SSPC SP 6:

B201010 1.4.1.1 - Epoxy System with Waterborne Light Industrial Coating Topcoat, DFT: 8.5 mils

a. New; MPI EXT 5.1D-G5 (Semigloss); Primer: MPI 101, Intermediate: MPI 108, Topcoat: MPI 163

B201010 1.4.2 - New Galvanized surfaces:

B201010 1.4.2.1 - Epoxy System with Waterborne Light Industrial Coating Topcoat, System DFT: 8.5 mils

a. New; MPI REX 5.3L-G5 (Semigloss); Primer: MPI 101, Intermediate: MPI 108, Topcoat: MPI 163

B201010 1.5 - PAINTED FINISHES TO EXTERIOR STUCCO SURFACES

B201010 1.5.1 - New stucco or plaster:

B201010 1.5.1.1 - Latex, System DFT: 4.5 mils

a. New; MPI EXT 9.1A-G5 (Semigloss)/Existing; MPI REX 9.1A-G5 (Semigloss); Primer: MPI 11, Intermediate: MPI 11, Topcoat: MPI 11

B201099 OTHER EXTERIOR WALLS

B201099 1.1 - FLASHING

Flashing for wall penetrations shall be aluminum or stainless steel. Aluminum shall conform to ASTM B 209/B 209M, 1.27 mm (0.050 inches) thick and shall be coated to match the item flashed. Stainless steel shall conform to ASTM A 167, type 302 or 304, 2D finish, fully annealed, dead soft temper. Thickness shall be a minimum of 0.4572 mm (0.018 inches).

B2020 EXTERIOR WINDOWS

Provide standard windows that are in compliance with ANSI/AAMA/NWWDA 101, SWI SWS, and the design criteria of ASCE 7 for glazed windows to meet the Building Code.

Provide aluminum windows that meet the requirements of AAMA/NWWDA 101/I.S. 2. Non-residential (commercial) construction shall utilize windows that comply with AAMA HC-60 designation unless the wind pressure on the building exceeds 293 Kg/m^2 (60 psf). Determine the wind pressure on the building by converting the ASCE-7 basic wind speed to wind pressure and find the corresponding structural test pressure in the AAMA specific requirements or optional performance tables. If the non-residential (commercial) window wind pressure exceeds 439 Kg/m^2 (90 psf), utilize a higher AAMA designated window complying with the calculated wind pressure.

Provide window cleaning access and anchorage to the exterior wall for facilities over three stories tall without interior window cleaning access from pivoting or tilting sash. Provide anchors in accordance with OSHA standard 29 CFR Section 1910.66.

Windows shall be provided with sills on the exterior and stools on the interior of the opening. Sills shall be masonry or precast concrete. Window stools shall be slate or solid polymer for commercial construction.

B202001 WINDOWS

Provide exterior standard windows system consisting of fixed sash used singly and in multiples. Provide jamb support for larger windows where recommended by manufacturer. Metal windows with insulating glass shall have thermally broken frames and sash.

Provide glazing in exterior windows in accordance with section B202004 EXTERIOR GLAZING.

B202001 1.1 - STANDARD WINDOW SYSTEMS

B202001 1.1.1 - Aluminum Windows

Conform to ANSI/AAMA/NWWDA 101. Factory finish aluminum windows and provide tinted glazing.

Exposed aluminum surfaces shall be factory finished with an AAMA organic coating. Provide a high-performance organic coating conforming to AAMA 2605 for commercial construction. AAMA coatings shall have a total dry film thickness of 1.2 mils.

B202001 1.1.1.1 - Forced Entry Resistance Aluminum Windows

In addition to meeting the requirements of AAMA 101, windows designated forced entry resistance to forced entry shall conform to the requirements of AAMA 1302.

B202004 EXTERIOR GLAZING

ASTM C 1036, unless specified otherwise. Exterior glazing shall be tinted, insulating glazing unless otherwise indicated in the program. Provide wire glass where required for fire rated windows. Provide patterned glass where required to obscure view into bathrooms and dressing rooms. Provide laminated glass where required for antiterrorism requirements. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

Provide setting and sealing materials, stops and gaskets as recommended by the glass or acrylic sheet manufacturer.

Provide warranty for insulating glass units for a period of 5-years against development of material obstruction to vision (such as dust or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage.

Glazing thickness indicated in the following paragraphs is the minimum acceptable thickness. Provide thicker glazing if required by the manufacturer for the given application.

B202004 1.1 - GLASS

B202004 1.1.1 - Clear Glass

Type I, Class 1 (clear), Quality q4 (A).

B202004 1.1.2 - Heat-Absorbing Glass

Type I, Class 2 (heat absorbing and light reducing), Quality q3 (select), 6 mm (1/4 inch) thick, with a light transmittance of approximately 45 percent and total solar transmittance of not more than 50 percent for 6 mm (1/4 inch) thickness. Use warm color tint for warm color frames and cool color tints for white and gray frames.

B202004 1.1.3 - Wire Glass

Type II, Class 1, Form 1, Quality q8 Mesh m1 or Form 2, Quality q7, Finish f1, Mesh m1, 6 mm (1/4 inch) thick. Conform to NFPA 80. Glass for fire-rated windows shall be UL listed and shall be rated when tested in accordance with ASTM E 163.

B202004 1.1.4 - Laminated Glass

Fabricated from two pieces of Type I, Class 1, Quality q3 glass laminated together with a clear 0.75 mm (0.030 inch) thick polyvinyl butyral interlayer. The total thickness shall be nominally 6 mm (1/4 inch).

B202004 1.1.5 - Insulating Glass Units

Provide 13 mm (1/2 inch) airspace. The inner light shall be one of the following:

a. Typically ASTM C 1036, Type I, Class 1, Quality q4, minimum 6 mm (1/4 inch) thick;

b. ASTM C 1048, Grade B (fully tempered), Style I (uncoated), Type I, Class 1 (transparent), Quality q4, minimum 6 mm (1/4 inch) thick when required by 16 CFR 1201 or possible glazing impact is anticipated;

c. Laminated glass as specified above, when required by antiterrorism requirements.

The outer light shall be one of the following:

a. Typically ASTM C 1036, Type I, Class 2 (tinted heat absorbing), Quality q4, minimum 6 mm (1/4 inch) thick;

b. ASTM C 1048, Grade B (fully tempered), Style I (uncoated), Type I, Class 2 (tinted heat absorbing), Quality q4, minimum 6 mm (1/4 inch) thick when required by 16 CFR 1201 or possible glazing impact is anticipated.

B202004 1.1.6 - Tempered Glass

ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent) or 2 (tinted heat absorbing, Quality q3, 6 mm (1/4 inch) thick.

B2030 EXTERIOR DOORS

Provide heavy duty insulated steel doors and frames for service access. Knockdown door frames are not permitted.

Use heavy-duty overhead holder and closer to protect doors from wind damage. Provide kickplates on the inside face of exterior doors.

Weather-protect all exterior doors and related construction with low infiltration weather stripping and sealants. Provide threshold with offset to stop water penetration while maintaining accessibility compliance.

Conform to the design criteria of ASCE 7.

See Section B203008, EXTERIOR DOOR HARDWARE, for door hardware requirements. Provide a recessed key box approximately 175 mm x 175 mm (7 inches x 7 inches) with 120 mm (4-3/4 inches) solid steel door at primary exterior entry for storage of keys and/or access cards accessible by the fire department.

B203001 GLAZED DOORS

Provide Exterior Glazed Doors and Entrances System including factory-finish aluminum framed door assemblies with insulated, tinted glazing, frames, and hardware compatible with other buildings in the vicinity and wall opening elements such as lintels, sills, thru-wall flashings, and joint sealers.

B203002 SOLID DOORS

Provide solid door assemblies other than at main entrance including painted heavy-duty, non-corroding, insulated doors with frames and hardware. Also provide louvers and accessories and wall opening elements such as lintels, sills, flashings and joint sealers.

B203002 1.1 - STEEL DOORS AND FRAMES

See Section B203001, GLAZED DOORS.

B203002 1.1.1 - Exterior Louvers

Louvers shall be inverted "Y" type with minimum of 30 percent net-free opening. Weld or tenon louver blades to continuous channel frame and weld assembly to door to form watertight assembly. Form louvers of hot-dip galvanized steel of same gage as door facings. Louvers shall have steel-framed insect screens secured to room side and readily removable. Provide aluminum wire cloth, 18 by 18 or 18 by 16 inch mesh, for insect screens. Net-free louver area to be before screening.

B203004 OVERHEAD AND ROLL-UP DOORS

Provide large exterior doors system consisting of automatic exterior doors and door assemblies.

B203004 1.1 - ROLLING SERVICE DOORS

Provide coiling overhead doors with minimum 22 gage thermal insulated slats, electric operators with 3-button switches conforming to NEMA MG 1, NEMA ICS 1, and NEMA ICS 2, and auxiliary hand chain operation, weather-stripping and wind-locks. Doors shall be capable of withstanding the design wind loading of ASCE 7 and still operate normally. Finish of the door shall be hot-dipped galvanized with a painted finish. Use of roll-up doors on exterior walls of conditioned spaces is not permitted. Overhead sectional doors are an acceptable substitute.

B203004 1.2 - SECTIONAL OVERHEAD DOORS

NAGDM 102, Industrial doors. Metal doors shall be horizontal sections hinged together which operate in a system of tracks to completely close the door opening in the closed position and make the full width and height of the door opening available for use in the open position. Doors shall be of the standard lift type designed to slide up and back into a horizontal overhead position and requiring a maximum of 400 mm (16 inches) of headroom

for 50 mm (2 inch) tracks and 525 mm (21 inches) of headroom for 75 mm (3 inch) tracks, unless a low headroom type is required due to limited headroom, or a high lift type or vertical lift type is required to allow additional working clearance in the area immediately inside the door. Doors shall be operated by three-button electric power conforming to NEMA MG 1, NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6. with auxiliary hand chain operation. Pushbuttons shall be full-guarded to prevent accidental operation. Provide limit switches to automatically stop doors at the fully open and closed positions. Limit switch positions shall be readily adjustable. Doors shall be capable of withstanding the design wind loading of ASCE 7. Doors shall remain operable and undamaged after conclusion of tests conducted in accordance with ASTM E 330 using the design wind load. Form door sections of hot-dipped galvanized steel not lighter than 16 gage with flush surface without ribs or grooves. Sections shall be not less than 50 mm (2 inches) in thickness. Insulate door sections with fibrous glass or plastic foam to provide a "U" factor of 0.14 or less when tested in accordance with ASTM C 236. Cover interior of door sections with steel sheets of not lighter than 24 gage to completely enclose the insulating material. Provide galvanized steel tracks not lighter than 14 gage for 50 mm (2 inch) tracks and not lighter than 12 gage for 75 mm (3 inch) track. Provide a positive locking device and cylinder lock with two keys on manually operated doors.

B203006 DOOR HARDWARE

Provide the services of a certified door hardware consultant to prepare the hardware schedule. Provide, as far as possible, door hardware of one manufacturer’s make. All hardware shall be clearly and permanently marked by the manufacturer where it will be visible after installation. Provide hardware keying compatible with the existing base-wide keying system. Replacement interchangeable cores shall be compatible with the Best Lock system.

B203006 1.1 - HINGES

BHMA A156.1, Size to match door size, but in no case less than 114 mm x 114 mm (4 1/2 x 4 1/2 inches), with non-removable pin and anti-friction bearing hinges. Use two hinges for doors 1500 mm (60 inches) or less in height and one additional hinge for each additional 750 mm (30 inches), or fraction thereof, in door height.

B203006 1.2 - PIVOTS

BHMA A156.4

B203006 1.3 - LOCKS AND LATCHES

Use BHMA A 156.13, Series 1000, Operational Grade 1, Security Grade 2 for exterior personnel doors and other high-use doors.

B203006 1.4 - EXIT DEVICES

BHMA A 156.3, Grade 1. Provide on exit doors if it is anticipated that more than 50 people may use a particular door in an emergency exit situation. Touch bars shall be provided in lieu of conventional crossbars and arms. Use manufacturer’s integral touch bars in aluminum storefront doors.

B203006 1.5 - EXIT LOCKS WITH ALARM

BHMA A 156.5.

B203006 1.6 - CYLINDERS AND CORES

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Cylinders and cores shall have seven pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets shall have interchangeable cores, which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

B203006 1.7 - KEYING SYSTEM

Provide a master key system for the facility, unless more than one tenant/tenant command shall reside in a facility. Provide a grand master keying system that is an extension the existing Base-wide keying system. Coordinate with Base for manufacturer of existing locks. Provide construction interchangeable cores when subcontractors require keys during construction. Provide key cabinet.

The Contractor shall coordinate a keying system meeting. The Contractor’s Project Manager, Superintendent, Hardware Subcontractor, Electrical Subcontractor (if keying hardware is electric), Designer of Record, Contracting Officer, Public Works Base Hardware Specialist, and the Using Activity shall attend this meeting to establish the keying system for the project. This meeting is intended to identify base limitations, the necessary security, and access control within the facility. The meeting shall produce a marked up copy of the floor plan indicating the doors to receive locks and the doors to be keyed together, and any master keying or grand master keying

B203006 1.8 - KEYS

Furnish one file key, one duplicate key and one working key for each key exchange and for each master and grand master keying system.

B203006 1.9 - LOCK TRIM

Cast, forged or heavy wrought construction and commercial plain in design.

B203006 1.9.1 - Knobs and Roses

Knobs and roses shall meet test requirements of BHMA A 156.2 and BHMA A 156.13.

B203006 1.9.2 - Lever Handles

Provide lever handles in lieu of knobs as required by UFAS and ADAAG. Lever handles shall meet the test requirements of BHMA A 156.13 for mortise locks.

B203006 1.10 - DOOR BOLTS

BHMA A 156.16, Grade 1. Provide two flush bolts for each inactive leaf of a pair of doors.

B203006 1.11 - CLOSERS

BHMA A 156.4, Series C02000, Grade 1, with PT 4C, full size case. Provide closers for all exterior doors, fire-rated doors, corridor doors, stairway doors, and secure area doors, as a minimum.

B203006 1.12 - OVERHEAD HOLDERS

BHMA A 156.8, Grade 1. Provide for exterior doors.

B203006 1.13 - DOOR PROTECTION PLATES

Provide kick plates conforming to BHMA A 156.6. Provide kick plates on all doors with closers and all doors leading to corridors or circulation spaces. Provide armor plates on all doors to receive cart traffic. Provide mop plates on all doors in rooms with a mopable floor finish that do not have kick plates.

B203006 1.14 - DOOR STOPS AND SILENCERS

BHMA A 156.16. Provide silencers, Type L03011, three per single door and four per double door, for doors in hollow metal frames.

B203006 1.15 - THRESHOLDS

BHMA A 156.21. Provide thresholds with offset to stop water infiltration, while maintaining accessibility requirements.

B203006 1.16 - WEATHERSTRIPPING

BHMA A 156.22. Air leakage of weatherstripped doors shall in exceed 0.5 CFM of air per square foot of door for residential doors, and 1.25 CFM for non-residential doors.

B203006 1.17 - RAIN DRIPS

Provide top and bottom rain drips for all exterior doors that open to the outside, where the door swing area is not covered by an overhang.

B203006 1.18 - FINISHES

Provide one of the following hardware finish systems, and match the interior door hardware:

a. BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closers which shall have aluminum paint finish, and except steel hinges which shall have BHMA 652 finish (satin chromium plated). Hinges for exterior doors shall be stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Exit devices may be provided in BHMA 626 finish in lieu of BHMA 630 finish. Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

b. BHMA A156.18. Hardware shall have BHMA 612 finish (satin bronze), unless specified otherwise. Surface door closers shall have bronze paint finish. Steel hinges shall have BHMA 639 finish (satin bronze plated). Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors. Hardware showing on interior of bathrooms, shower rooms, toilet rooms, washrooms, laundry rooms, and kitchens shall have BHMA 629 finish (bright stainless steel) or BHMA 625 finish (bright chromium plated).

- End of Section –

SECTION B30

ROOFING
02/05

B30 GENERAL

B30 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for roof finishes, insulation, flashings and trim, drainage and roofing penetrations. Selection and application of roof coverings and flashings shall be in compliance with the standards established by the NRCA.

B30 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

B30 1.2.1 - Industry Standards and Codes

Roofing Industry Educational Institute (RIEI), Roof Maintenance Manual

American Society of Civil Engineers (ASCE) Standard 7, “Minimum Design Loads for Building and Other Structures”

ANSI/SPRI, “Wind Design Standards for Edge Systems”

Factory Mutual Engineering Corporation (FM), “Approval Guide”

Factory Mutual Engineering Corporation (FM), “Loss Prevention Data Sheets for Roofing Contractors”

International Building Code (IBC)

National Roofing Contractors Association (NRCA), “Roofing and Waterproofing Manual”

SMACNA, “Sheet Metal Manual”

B30 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 3-110-03, “Design: Roofing”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings

B30 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design,”

UFC 1-300-09N, “Design Procedures,”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-110-03, “Design: Roofing,”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements,”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

B30 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

B30 1.4.1 - Pre-Roofing Conference

Prior to beginning roofing work, the Contractor shall hold a Pre-Roofing Conference with the personnel directly responsible for the roofing systems work, as well as the roofing manufacturer’s technical representative. At this time the Contractor will address any conflicts between the proposed roofing system, the design documents, and the scheduling of work / workers (trades) to assure a watertight roofing installation. Resolutions will be obtained and documented in writing prior to the start of roofing work. A quality assurance/quality control plan shall also be established at this time, inclusive of the roofing manufacturer’s recommended testing and inspections procedures, and in accordance with industry standard guidelines.

Contractor shall provide the following additional information at the pre-roofing conference: Procedure for the roof manufacturer’s technical representative’s onsite inspection and acceptance of the roofing substrate, roof insulation, and installation of the roofing in accordance with the roof system warranty, the name of the manufacturer’s technical representatives, the frequency of the onsite visits, copies of the roof status reports from the technical representatives to the roof manufacturer, and pertinent structural details to the roofing system.

B30 1.4.2 - Roof Design Assurance

The Contractor shall utilize the services of a Registered Roof Consultant (RRC) certified by Roof Consultant Institute or a Registered Professional architect or Engineer that specializes in roofing to approve the roof design. The roof consultant must have at least 50% of his business dealing solely with roofing design and roofing construction. The roof consultant shall verify in writing that the

design for the project is in accordance with the current edition of NRCA, Roofing and Waterproofing Manual, and the RFP.

B30 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

B30 1.5.1 - Low Slope Roof Drain Test

Plug roof drains and fill with water to the edge of the drain sump for 24 hours. Not all drains shall be tested at one time. Measure water at the beginning and end of the 24 hour time period to ensure there is no leakage. Repeat testing until all leaks have been located, corrected, and no leaks found.

B30 1.5.2 - Quality Control Program

Contractor shall establish a quality control program to assure adherence to NRCA recommended Quality Control Guidelines for the Application of Roofing Systems and other specified application requirements. Compliance with Section 01450, “Quality Control” is required.

B30 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

B30 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

B30 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings;

Sheet Metal Items (to include, but are not limited to the following: gutters, downspouts, gravel stops and fascias, flashing for roof drains, base and counter-flashings, flashing at roof penetrations, reglets, scuppers, copings, drip edge, open valley flashing, etc.); G

Structural Standing Seam Metal Roof System; G

Metal roofing drawings and specifications and erection drawings; shop coating and finishing specifications; and other data as necessary to clearly describe design, materials, sizes, layouts, standing seam configuration, construction details, provisions for thermal movement, line of panel fixity, fastener sizes and spacings, sealants and erection procedures. Drawings shall reflect the intent of the architectural detailing using the manufacturer's proprietary products and fabricated items as required. The SSSMR system shop drawings shall be provided by the metal roofing manufacturer.

SD-03 Product Data;

Accessories; G

Design Analysis (for Structural Metal Roofing); G.

Design analysis signed by a Registered Professional Engineer employed by the SSSMR manufacturer. The design analysis shall include a list of the design loads, and complete calculations for the support system (when provided by the Contractor), roofing system and its components; valley designs, gutter/downspout calculations, screw pullout test results, and shall indicate how expected thermal movements are accommodated.

Fasteners; G

Flashing; G

Insulation; G

Sample Warranty Certificate; G

Sealant; G

Asphalt; G

Felts; G

Roofing Panels; G

Roof Membrane Sheet; G

SD-04 Samples;

[Metal Panels; G]

SD-05 Design Data;

Load Calculations; G

Wind uplift calculations; G

SD-06 Test Reports;

Field Inspection Tests; G

Flame Spread and Smoke Developed Ratings; G

Structural Performance; G

Metal Panels – Tests to include the following: Chalking, Color Change; G

Test Report for Uplift Resistance of the SSSMR; G.

The report shall include the following information:

a. Details of the SSSMR system showing the roof panel cross-section with dimensions and thickness.

b. Details of the anchor clip, dimensions, and thickness.

c. Type of fasteners, size, and the number required for each connection.

d. Purlins / sub-purlins size and spacing used in the test.

e. Description of the seaming operation including equipment used.

f. Maximum allowable uplift pressures. These pressures are determined from the ultimate load divided by a factor of safety equal to 1.65.

g. Any additional information required to identify the SSSMR system tested.

h. Signature and seal of an independent registered engineer who witnessed the test.

SD-07 Certificates

Structural Standing Seam Metal Roof System; G.

a. Certification that the actual thickness of uncoated sheets used in SSSMRS components including roofing panels, sub-purlins, and concealed anchor clips complies with specified requirements.

b. Certification that materials used in the installation are mill certified.

c. Previous certification of SSSMR system tested under the ASTM E 1592 testing.

d. Certification that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than three pieces has been tested and has met the quality standards specified for factory color finish.

e. Certification of installer.

f. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Structural Standing Seam Metal Roof (SSSMR) System, a sample copy of which is attached to this section, [and] the 20-year Manufacturer's Material Warranties, [and the manufacturer's 20-year system weather-tightness warranty].

SD-08 Manufacturer’s Instructions

Application; G

Installation; G

SD-10 Operation and Maintenance Data

Metal Roof Panels, Data Package 2

Modified Bitumen Roof Sheet, Data Package 2

Traffic Pads, Data Package 2

SD-11 Closeout Submittals

Submit information card (see "Form 1" at the end of this section) and Warranty. Provide a typewritten card, laminated in plastic and framed in a weather-tight frame, or a photoengraved 0.81mm (0.032-inch) thick aluminum card for the roof. This card shall be a minimum size of 216 x 280mm (8 1/2 x 11 inch) and contain information listed in the attached Form 1. Install the card where directed. Furnish framed card and a duplicate card to the Contracting Officer.

B3010 ROOF COVERINGS

The use of vapor retarder in the southeastern United States is typically not required nor desired while in the upper Midwest the vapor retarder may be a necessary component of the roof system. The designer is responsible for the design and justification of vapor retarders. Vapor retarder design guidance can be found in the ASHRAE Handbook(current edition), “Vapor Retarders for Membrane Roof Systems”, by Wayne Tobiasson of U.S. Army Cold Regions Research and Engineering Laboratory (CRREL).General guidance can be found in the NRCA Roofing and Waterproofing Manual.

Consider the use of air retarders within the roof system as necessary to reduce the billowing and flutter effects of wind action and interior building pressures on the roof membrane. Air retarders can be especially effective in high wind areas involving mechanically attached membrane systems installed over air permeable decks and in buildings with large door openings that can create excessive interior building pressure. Vapor retarders, when used, also serve as an air retarder.

Roof coverings shall comply with the requirements of UFC 3-110-03, “Design: Roofing,” and NRCA, “Roofing and Waterproofing Manual” as the primary NAVFAC roofing criteria. Roof selection shall comply with UFC 3-330-02A, “Design: Commentary on Roof Systems.

B301001 ROOF FINISHES

Slope conversions from low slope to steep slope roofing systems must specifically address temporary waterproofing protection where new framing connections penetrate the existing low slope system.

B301001 1.1 - STRUCTURAL METAL ROOFING SYSTEM

B301001 1.1.1 - Structural Standing Seam Metal Roof (SSSMR) System

The SSSMR system covered under this specification shall include the entire roofing system; the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system.

This specification does not include the metal deck that is part of the building structure.

B301001 1.1.2 - Design Requirements

The design of the SSSMR system shall be provided by the Contractor as a complete system, in accordance with ASCE 7. Framing members and connections not indicated on the drawings shall be designed by the Contractor. Roof panels, components, transitions, accessories, and assemblies shall be supplied by the same roofing system manufacturer.

B301001 1.1.2.1 - Dead Loads

The dead load shall be the weight of the SSSMR system. Collateral loads such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.

B301001 1.1.2.2 - Concentrated Loads

The panels and anchor clips shall be capable of supporting a 300 pound concentrated load. The concentrated load shall be applied at the panel mid-span and will be resisted by a single standing seam metal roof panel assumed to be acting as a beam. The un-deformed shape of the panel shall be used to determine the section properties.

B301001 1.1.2.3 - Uniform Loads

The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.

B301001 1.1.2.4 - Roof Snow Loads

The design roof snow loads shall be as shown on the contract drawings.

B301001 1.1.2.5 - Wind Loads

The design wind uplift pressure for the roof system shall be as shown on the contract drawings. The design uplift force for each connection assembly shall be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly. The safety factor listed below shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when figuring fastener design loads.

a. Single fastener in each connection.....3.0

b. Two or more fasteners in each connection...2.25

B301001 1.1.2.6 - Framing Members Supporting the SSSMR System

New or revised framing members and their connections shall be designed in accordance with AISC 335, AISI SG-973, or SJI Specs & Tables. Maximum deflection under applied live load, snow, or wind load shall not exceed 1/180 of the span length.

B301001 1.1.2.7 - Roof Panels Design

Steel panels shall be designed in accordance with AISI SG-973. Aluminum panels shall be designed in accordance with AA ADM. The panel deflection from concentrated loads shall not exceed 1/180 of the span length. The panel deflection under applied live load, snow, or wind load shall not exceed 1/180 times the span length. Deflections shall be based on panels being continuous across three or

more supports. Deflection shall be calculated and measured along the major ribs of the panels.

B301001 1.1.3 - Performance Requirements

The SSSMR shall be tested for wind uplift resistance in accordance with ASTM E 1592; SSSMR systems previously tested and approved may be acceptable.

B301001 1.1.3.1 - Contractor's Weather-Tightness Warranty

The SSSMR system shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system; and items specified in other sections of these specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's required warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty

B301001 1.1.3.2 - Manufacturer's Material Warranties.

The Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material:

a. A manufacturer's 20 year material warranty warranting that the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244.

Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

c. A roofing system manufacturer's 20 year, non-prorated, system weathertightness warranty.

B301001 1.1.4 - Roof Panels

Panels shall be steel or aluminum and shall have a factory color or mill finish. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope for slope lengths that do not exceed 30 feet. When length of run exceeds 30 feet and panel laps are provided, each sheet in the run shall extend over three or more supports. Sheets longer than 100 feet may be furnished if approved by the Contracting Officer. Width of sheets shall provide not more than 24 inches of coverage in place. SSSMR system with roofing panels greater than 12 inches in width shall have standing seams rolled during installation by an electrically driven seaming machine.

B301001 1.1.4.1 - Steel Panels

Steel panels shall be zinc-coated steel conforming to ASTM A 653/A 653M; aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 55 coating; or aluminum-coated steel conforming to ASTM A 463/A 463M, Type 2, coating designation T2 65. Zinc, zinc-aluminum alloy or aluminum coated panels shall be 0.023 inch thick minimum.

B301001 1.1.5 - Concealed Anchor Clips

Concealed anchor clips shall be the same as the tested roofing system.

B301001 1.1.6 - Accessories

Flashing, trim, metal closure strips, caps and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the panels furnished.

B301001 1.1.7 - Fasteners

Fasteners for steel roof panels shall be zinc-coated steel, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for structural connections shall provide both tensile and shear ultimate strengths of not less than 750 pounds per fastener. Exposed roof fasteners shall be sealed or have sealed washers on the exterior side of the roof to waterproof the fastener penetration. Washer material shall be compatible with the roofing; have a minimum diameter of 3/8 inch for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8 inch thick. Exposed fasteners for factory color finished panels shall be factory finished to match the color of the panels.

B301001 1.1.7.1 - Screws

Screws for attaching anchor devices shall be not less than No. 14

B301001 1.1.7.2 - Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with locking washers and nuts.

B301001 1.1.7.3 - Structural Blind Fasteners

Blind screw-type expandable fasteners shall be not less than 1/4 inch diameter. Blind (pop) rivets shall be not less than 9/32 inch minimum diameter.

B301001 1.1.8 - Sub-Purlins

Cold formed supporting structural members/sub-purlins shall have a minimum thickness of 0.059 inches and a minimum tensile yield strength of 50000 psi. Hot rolled structural members shall have a minimum thickness of 0.25 inches and a minimum tensile yield strength of 36000 psi. Sub-purlins shall be galvanized.

B301001 1.1.9 - Factory Color Finish

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. The exterior coating shall be a nominal 2 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 1.0 mil thickness. The interior color finish shall consist of the same coating and dry film thickness as the exterior. The exterior color finish shall meet the test requirements specified below.

B301001 1.1.9.1. - Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, over 21/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

B301001 1.1.9.2 - Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

B301001 1.1.9.3 - Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

B301001 1.1.9.4 - Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no cracking.

B301001 1.1.9.5 - Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 80 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

B301001 1.1.9.6 – Specular Gloss

Finished roof surfaces shall have a specular gloss value of 30 plus or minus 5 at 60 degrees when measured in accordance with ASTM D 523.

B301001 1.1.9.7 - Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

B301001 1.1.10 - Insulation

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518.

B301001 1.1.10.1 - Polyisocyanurate Rigid Board Insulation for Use Above a Roof Deck

Polyisocyanurate insulation shall conform to ASTM C 1289, Type II.

B301001 1.1.10.2 - Glass Mat Gypsum Roof Board

Glass mat gypsum roof board for use above the deck or insulation for thermal protection shall have a flame spread - 0, smoke developed - 0, shall be water resistant and have a compressive strength of 500 psi. Glass mat gypsum roof board shall conform to ASTM C 1177/C 1177M.

B301001 1.1.11 - Sealant

Sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color or clear and shall cure to a rubber like consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

B301001 1.1.12 - Vapor Retarder

B301001 1.1.12.1 - Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96

B301001 1.1.12.2 - Vapor Retarders Separate from Insulation

Vapor retarder material shall be polyethylene sheeting conforming to ASTM D 4397. A single ply of 10 mil polyethylene sheet; or, at the Contractor's option, a double ply of 6 mil polyethylene sheet shall be used. A fully compatible polyethylene tape with equal or better water vapor control characteristics than the vapor retarder material shall be provided. A cloth industrial duct tape in a utility grade shall also be provided to use as needed to protect the vapor retarder from puncturing.

B301001 1.1.12.3 - Slip Sheet for Use With Vapor Retarder

Slip sheet for use with vapor retarder shall be a 5 lb. per 100 square feet rosin-sized, unsaturated building paper.

B301001 1.1.13 - EPDM Rubber Boots

Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base

rings made of aluminum or corrosion resisting steel that conform to the contours of the roof panel to form a weather-tight seal.

B301001 1.1.14 - Prefabricated Curbs And Equipment Supports

Prefabricated curbs and equipment supports shall be of structural quality, hot-dipped galvanized or galvanized sheet steel, factory primed and prepared for painting with mitered and welded joints. Integral base plates and water diverter crickets shall be provided. Minimum height of curb shall be 8 inches above finish roof. Curbs shall be constructed to match roof slope and to provide a level top surface for mounting of equipment. Curb flange shall be constructed to match configuration of roof panels. Curb size shall be coordinated, prior to curb fabrication, with the mechanical equipment to be supported. Strength requirements for equipment supports shall be coordinated to include all anticipated loads. Flashings shall not be rigidly attached to underline structure.

B301003 ROOF INSULATION

Provide insulation with a “U” value not greater than 0.0333.

B301003 1.1 - ROOF AND DECK INSULATION

This paragraph covers the requirements for insulation materials used below built-up and single-ply roofing systems.

B301003 1.1.1 - Insulation Types

Roof insulation shall have an R-value determined per ASHRAE Standard 90.1 (latest edition) and be one or an assembly of a maximum of three of the following materials and compatible with attachment methods for the specified insulation and roof membrane:

a. Expanded Perlite Board – ASTM C 728, minimum thickness of 3/4" boards, and 4’ by 4’ board size.

b. Polyisocyanurate Board – ASTM C 1289, with a minimum compressive strength of 138 kPa (20 psi), unless overlaid with another board with a comparable or greater compressive strength. Use insulation facer as recommended by the roofing material manufacturer. Board size shall be restricted to 4’ by 4’ when applied in direct contact with concrete deck.

c. Composite Boards – ASTM C 984 (Polyisocyanurate-perlite) or ASTM C 1050 (Polystyrene-wood fiberboard), Type III, Grade 1, Class A, or ASTM C 1289, Type V, oriented strand board or waferboard on one side and fibrous felt or glass fiber mat membrane or aluminum foil on the other.

B301003 1.1.2 - Tapered Roof Insulation

Provide tapered roof insulation system as necessary to provide positive drainage of roof system, and to include drainage around curbs, penetrations, and projections through the roof plane. For new construction, provide one layer of the tapered roof insulation assembly factory tapered to a slope not less than 13 mm per 300 mm (1/2" per foot). For re-roofing applications where slopes of 13 mm per 300 mm (1/2" per foot) cannot be achieved, provide a minimum of 6.35 mm per 300 mm (1/4" per foot) slope.

B301003 1.1.3 - Protection Board

Provide for use as a thermal barrier (underlayment) or protection board for hot-mopped applications.

B301003 1.1.4 - Glass Mat Gypsum Roof Board

ASTM C 1177, with a 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84.

B301003 1.1.5 - Bitumens

B301003 1.1.5.1 - Asphalt Primer

ASTM D 41

B301003 1.1.5.2 - Asphalt

ASTM D 312, Type III or IV

B301003 1.1.5.3 - Asphalt Roof Cement

ASTM D 4586, Type I for horizontal surfaces, Type II for vertical and sloped surfaces. Roof cement shall be compatible with membrane materials.

B301003 1.1.6 - Vapor Retarder

B301003 1.1.6.1 - Asphalt-Saturated Felt Base Sheet for Single Layer Application

ASTM D 4601

B301003 1.1.6.2 - Asphalt-Coated Glass Felt

ASTM D 2178, Type IV

B301003 1.1.7 - Seal at Penetrations

Provide pre-manufactured flashing components for use in single-ply roofing applications. Seal laps and penetrations to prevent moisture vapor penetration. Adhesives, sealants, prefabricated components and spray foam products may be required.

B301003 1.1.8 - Fasteners

Fasteners shall be flat, round or hexagonal steel (not less than 35 mm (1 3/8″) diameter) and 28 gage, or plastic plates (not less than 75 mm (3 inches) in diameter).

Fasteners in lightweight cellular concrete decks shall penetrate at least 25 mm (1 inch) but not more than 32 mm (1 1/2 inches) into the deck. Withdrawal resistance from lightweight cellular concrete deck shall be not less than 18 kg (40 lbs.) each, or 54 kg (120 lbs.) each in metal deck.

Fasteners in steel decks shall be hardened fasteners or screws conforming to FM A/S4470 and listed in FM P7825 for Class I roof deck construction.

Fasteners shall be place to withstand an uplift pressure of 120 pounds per square foot) in the field of the roof and FM LPDS 1-49 for perimeter component and flashing attachment.

B301003 1.1.8.1 - Roofing Nails

Provide corrosion resistant ring shank nails of sufficient length to penetrate a minimum of 25 mm (1 inch) into wood nailers or so as to

provide appropriate embedment in substrate below. Fasteners shall conform to FM A/S4470, and be placed to withstand an uplift pressure of 4.3 kPa (90 psf) conforming to FM P7825, and FM 1-49 for perimeter fasteners.

B301003 1.1.9 - Wood Nailers

Wood nailers shall be pressure-preservative-treated in accordance with AWPA M2 Standards, permanently marked or branded, and installed flush with the top of the adjacent insulation board.

B301004 FLASHINGS AND TRIM

B301004 1.1 - FLASHING AND SHEET METAL

This paragraph covers the requirements for flashing and sheet metal work including scuppers, splash pans, and sheet metal roofing. Flashing and sheet metal shall be provided in accordance with roof manufacturer's printed installation instructions and in compliance with NRCA and SMACNA recommendations.

B301004 1.1.1 - Materials

Furnish sheet metal items in 2 (8 to 10 foot) lengths. Sheet metal items include the following: gutters, including hangers; downspouts; counter-flashings; gravel stops and fascias; cap, valley, stepped, base and eave flashings and related accessories.

B301004 1.1.1.1 - Stainless Steel

ASTM A 167, Type 302 or 304, 2D finish, fully annealed, dead-soft temper.

B301004 1.1.1.2 - Aluminum Alloy Sheet and Plate

ASTM B 209

B301004 1.1.1.3 - Pre-Finished Aluminum

Provide trim, gravel stops and fascias of Pre-finished aluminum. Finish shall be baked-on factory applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating with a minimum thickness of 0.8 to 1.3 mils.

B301004 1.1.1.4 - Aluminum alloy, Extruded Bars, Rods, Shapes, and Tubes

ASTM B 221

B301004 1.1.1.5 - Solder

ASTM B 32

B301004 1.1.1.6 - Polyvinyl Chloride Reglet

ASTM D 1784, Type II

B301004 1.1.1.7 - Asphalt Primer

ASTM D 41

B301004 1.1.1.8 - Fasteners

Fasteners shall be of the same or compatible metal with the item being fastened. Stainless steel fasteners shall be used to fasten dissimilar materials.

B301004 1.1.2 - Field Quality Control

Fabrication and installation of sheet metal items shall be as follows:

a. Install work with watertight and hairline joints, without waves, warps, buckles, fastening stresses, or distortion, allowing for expansion and contraction.
b. Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry and free of defects and projections that could affect the application.
c. Provide sheet metal flashing in angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight.
d. Provide prefabricated inside and outside corners at all sheet metal intersection pieces. Minimum leg length shall be 300 mm (12 inches), maximum length shall be 450 mm (18 inches).
e. Sheet metal shall be fabricated to conform to the contours of surfaces to which applied.
f. All sheet metal cap flashings shall have waterproof membrane underlayment installed behind or below the metal components.
g. Provide conforming sheet metal closures at all flashing termination conditions.
h. Provide fastenings and accessories as required to provide a securely attached, watertight construction. Cleats shall be a minimum of one gage heavier than the component to be attached.
i. Where sheet metal components are to be embedded in the roofing system, prime both sides of all metal flanges prior to installation.

B301005 GUTTERS AND DOWNSPOUTS

Provide gutters and downspouts compatible with roofing material and finish. Concealed (interior) gutters and downspouts are prohibited. The primary and secondary drainage systems shall be sized per applicable Plumbing and Building Codes.

B301005 1.1 - FINISH

Provide gutters, downspouts, hangers, gravel stops and fascias of pre-finished aluminum. Finish shall be baked-on factory applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating with a minimum thickness of 0.8 to 1.3 mils.

B301006 ROOF OPENINGS AND SUPPORTS

GENERAL REQUIREMENTS

Provide flashings for roof openings and supports as recommended and as specified below:

Maintain a minimum distance of 300 mm (12 inches) between roof penetrations. When existing pitch pans cannot be avoided and must be utilized, insure pitch pan is a preformed pan with minimum 100 mm (4-inch) height and 50 mm (2-inch) flange with 50 mm (2-inch) clearance on all sides of the penetration. Fill bottom 1/3 with non-shrink grout. Fill remainder with pourable elastomeric sealer sloped to drain. Require a metal umbrella cap clamped to the penetration when possible.

Assure all penetration flashings extend minimum 200 mm (8 inches) above the finished roof surface. Use round shapes to construct equipment supports. Equipment supports should be raised on a continuous curb a minimum of 350 mm (14 inches), but not less than shown below. Note that these minimums apply at the end of the equipment support on the upslope side of the framing.

Width of Equipment	Height of Curb
Up to 625 mm (25″)	350 mm (14″)
625 to 925 mm (25 to 37″)	450 mm (18″)
925 to 1225 mm (37 to 49″)	600 mm (24″)
1225 to 1525 mm (49 to 61″)	750 mm (30″)
1525 mm (61″) and wider	1200 mm (48″)

B301006 1.1 - ROOF HATCHES

Construct using NRCA approved techniques and details. Provide roof hatch as access to roof when roof mounted equipment is used or other routine roof maintenance is required.

B301006 1.1.1 - Construction

Provide insulated roof hatches of 14 gage galvanized steel with 22 gage galvanized steel liner or 18 gage aluminum liner, and have integral curb, flange and flashings for securing to roof deck. Hinge shall be heavy-duty zinc plated steel with non-removable pins. Latching mechanism shall be zinc-coated steel slam latch with inside and outside levers. Springs shall be greased compression springs in telescopic tubes. Provide interior locking of roof hatch. Size roof hatch to allow access of routine maintenance equipment, but not less than (2′-6″ x 3′-0″).

B301006 1.2 - GUARDS

Provide rails or guards as required by the International Building Code.

B301099 OTHER ROOFING

B301099 1.1 - LIGHTNING PROTECTION

Lightning protection component penetrations and attachments shall be sealed and flashed and anchored in a permanent manner and in a manner to avoid the degradation of the watertight integrity of the roof system. Mastic seals in the plane of the roof are unacceptable. Anchor plates set in mastic shall be set on roof surface cleaned of aggregate and loose material prior to mastic application.

-- End of Section --

FORM 1
ROOFING SYSTEM COMPONENTS

1. Contract Number: _____
2. Building Number and Location: _____
3. NAVFAC Specification Number: _____
4. Deck Type: _____
5. Slope of Deck: _____
6. Insulation Type and Thickness:_____
7. Insulation Manufacturer: _____
8. Vapor Retarder (_____) Yes (_____) No
9. Vapor Retarder Type: _____
10. Roofing Description: _____

    Manufacturer (Name, address, and phone no.): _____

    _____

    Type: _____

    Method of attachment: _____
11. Statement of Compliance or Exception: _____

    _____

    _____
12. Date Roof Completed: _____
13. Warranty Period: _____
14. Roofing Contractor (Name and Address):

    _____

    _____

    _____
15. Prime Contractor (Name and Address):

    _____

    _____

    _____

Contractor's Signature _____ Date: _____

Inspector's Signature _____ Date: _____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

FACILITY DESCRIPTION_____

BUILDING NUMBER:_____

CONTRACT NUMBER:_____

CONTRACTOR

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE SSSMR SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY _____ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH ASTM E 1592. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE SSSMR SYSTEM.

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE SSSMR SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE SSSMR SYSTEM DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.

6. THIS WARRANTY APPLIES TO THE SSSMR SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS THAT IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

**

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

**REPORTS OF LEAKS AND SSSMR SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE SSSMR SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, THE PARTIES SHALL, WITHIN TEN (10) DAYS, JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

SECTION C10

INTERIOR CONSTRUCTION
07/04

C10 GENERAL

C10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design/Build (D/B) Request for Proposal to determine the full requirements of this solicitation.

This section includes the requirements for interior fixed and operable partitions, interior doors/windows and frames, hardware, and other interior specialties and accessories.

C10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specification Web site. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

C10 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

Wood Door Manufacturer’s Association (WDMA) I.S.1-A “Interior Doors”

The Engineered Wood Association (APA)

C10 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, Design: “General Building Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

C10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design,”

UFC 1-300-09N, “Design Procedures,”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements,”

UFC 3-800-10N, “Design: General Environmental Requirements,”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”.

C10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

Assemblies requiring fire-ratings shall be inspected during the course of the work and shall meet all requirements of the referenced UL Design referenced by the Designer of Record (Architect or Engineer) on the Construction Documents. Items not found in compliance will be required to be removed, or corrective measures taken to assure compliance with the referenced standard.

C10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory interior construction assemblies performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

C10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

C10 1.6.1 - DESIGN SUBMITTAL SPECIFICATION

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

C10 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Doors and Frames; provide a schedule of doors, frames and details; G

Hardware Schedule; G

Keying Schedule; G

Accordion Folding Partitions / Partition Layout; G

Cabinets; G

Interior Room and Direction Plaque Signs; G

Operable Panel Partition Suspension System; G
Prefabricated Millwork; G

Reinforcing Steel; G

Sprayed Fire-Resistive Materials, showing extent of material application as required by the design for the fire-rated assemblies indicated; GSteel Stair Fabrication Drawings; G

SD-03 Product Data

Fragment Retention Film; G

Lockers; G

Solid Polymer Fabrications; G

Steel Shelving Units; G

Toilet and Bath Accessories – Manufactured Units; G

Visual Display Boards; G

SD-04 Samples

Prefaced Concrete Masonry; G

Interior Room and Direction Plaque Signs; G

SD-05 Design Data

Concrete Mix Design; G

SD-06 Test Reports

Firestopping; G

Accordion Folding Partitions; G

Concrete Mix Design; G

Operable Panel Partitions; G

Fire-rated CMU; G

SD-07 Certificates

Firestopping; G

Certificates of Grade – Wood/Plywood; G

Fragment Retention Film; G

Fire-rated CMU; G

SD-10 Operation and Maintenance Data

Doors; Data package 1; G

Floor Finish; Data Package 1; G

Hardware Schedule Items, Data Package 1; G

Solid Polymer Fabrications, Data Package 1; G

Sprayed-Applied Fireproofing, Data Package 1; G
Windows, Data Package 1; G

Provide complete set of AUTOCADD record drawings for the buildings ACAD.DWG Files must be independent drawing files; G

Accordion Folding Partitions, Data Package 1; G

Operable Panel Partitions, Data Package 1; G

SD-11 Closeout Submittals

As-built wiring diagrams for hard-wired electrical components; G

C1010 PARTITIONS

For general use, metal studs and standard grade GWB, CMU with prime filler coat, or CMU/cast-in-place concrete with GWB or skim coat plaster are acceptable as shown in the Project Program, Engineering Systems Requirements and Spaces Requirements matrices. Reinforce points where doorknobs can strike a wall and anchorage points for wall mounted equipment.

Provide control joints and installation techniques as recommended by the manufacturer. See Section C30, “Interior Finishes” for additional information.

Provide painted GWB with access panels at surfaces furred for HVAC, plumbing and other utility services and controls behind wall surfaces.

Acceptable systems where “IMPACT RESISTANCE” (areas subject to physical abuse or wear) is designated in the project program requirements for impact resistance systems include:

1) CMU/cast-in-place concrete with plaster or furred impact resistant GWB or surface applied impact resistant textured acrylic architectural coating system.

2) GWB/metal stud system reinforced for impact resistance with double layer of impact resistant gypsum board and cleanable surface treatment system resistant to denting and puncturing.

C101001 FIXED PARTITIONS

This paragraph covers interior fixed partitions, to include metal studs, GWB, plaster, masonry and cast-in-place concrete walls.

C101001 1.1 - CAST-IN-PLACE CONCRETE WALLS

Accomplish work in accordance with ACI Publications.

C101001 1.1.1 - Concrete Mix Design

Concrete Mix Design shall indicate that the mix design will produce concrete that will be suitable for the job conditions. Concrete mixture

shall provide an average compressive strength of 20,680 kPa (3000 PSIand meet or exceed ACI 301/301M.

C101001 1.1.2 - Reinforcing Steel Drawings

ACI 315.

C101001 1.1.2.1 - Reinforcing Bars

ACI 301/301M.

C101001 1.1.3 - Formwork

Provide formwork of wood, plywood or steel. Use plywood or steel where a smooth form finish is required.

C101001 1.1.4 - Cement

ASTM C 150, Portland cement, Type I or II.

C101001 1.1.5 - Aggregates

ASTM C 33.

C101001 1.1.6 - Water

Water shall be fresh, clean and potable; free from substances deleterious to concrete.

C101001 1.1.7 - Non-shrink Grout

ASTM C 1107.

C101001 1.2 - CONCRETE MASONRY UNIT PARTITIONS

Accomplish work in accordance with ACI 318/318M, ACI 530.1, and ASTM Standards for concrete masonry wall construction.

C101001 1.2.1 - Testing

Masonry strength shall be determined in accordance with ACI 530.1. Where fire-rated assemblies are indicated, provide concrete masonry units that have been tested in conformance with ASTM E 119. Provide certificate of compliance with rating indicated on the drawings and masonry tested for these assemblies.

C101001 1.2.2 - Seismic Requirements

The contractor shall provide additional seismic reinforcement as required for project. The maximum spacing of reinforcing bars shall be as follows:

WALL TYPE	VERTICAL	HORIZONTAL
Structural	600 mm (24″)	1200 mm (48″)
Non-Structural	1200 mm (48″)	2000 mm (80″)

C101001 1.2.3 - Concrete Masonry Units

Units of modular dimensions and air, water or steam cured. Surfaces of units to be plastered or stuccoed shall be sufficiently rough to provide bond and exposed surfaces of units shall be smooth and of uniform texture.

a. Hollow Load-Bearing Units: ASTM C 90, Type I or II, made of lightweight or normal weight aggregate.

b. Hollow Non-Load-Bearing Units: ASTM C 129, Type I or II, made with lightweight or normal weight aggregate.

c. Special Shapes: Provide special shapes as necessary to complete the work.

d. Fire-Rated CMU: Products shall be tested and approved by United Laboratories (UL) according to testing methods described in ASTM E 119, and listed as 2, 3 or 4-hour fire-rated.

C101001 1.2.4 - Mortar

Provide ASTM C 270, Type N or S for non-shear-wall interior masonry.

C101001 1.2.5 - Portland Cement

ASTM C 150, Type I, II, or III.

C101001 1.2.6 - Masonry Cement

ASTM C 91, Type N, S, or M.

C101001 1.2.7 - Sand

ASTM C 144

C101001 1.2.8 - Water

Clean, potable, and free from substances that could adversely affect the mortar.

C101001 1.2.9 - Grout

ASTM C 476, Fine aggregate for grouting cells / spaces 75 mm (3″) or less, or coarse aggregate for grouting cells / spaces greater than 75 mm (3″). Slump between 200 and 275 mm (8 and 11 inches). Provide minimum grout strength of 2000 PSI in 28 days, as tested per ASTM C 1019.

C101001 1.2.10 - Masonry Accessories

a. Horizontal Joint Reinforcement – Fabricate from cold drawn steel wire, ASTM A 82. Wire shall be hot-dipped galvanized after fabrication in accordance with ASTM A 153/ A 153M, Class B-2, 42.52 g / 0.0929 sq. meter (1.5 ounces of zinc per square foot).

b. Anchors and Wall Ties – Provide of stainless steel, ASTM A 167, Type 304, zinc-coated steel.

c. Reinforcing Bars – ASTM A 615 / A 615M.

C101001 1.3 - PRE-FINISHED MASONRY UNITS

Accomplish work in accordance with ASTM standards as referenced.

C101001 1.3.1 - Pre-Faced Concrete Masonry Units

Provide pre-faced concrete masonry units conforming to ASTM C 744, load-bearing or non-load-bearing, lightweight, Grade N, Type I.

C101001 1.3.2 - Mortar

ASTM C 270, Type S or N, Type I Portland cement, standard gray in color.

C101001 1.3.3 - Grout

ASTM C 476, fine aggregate for grouting cells / spaces 75 mm (3″) or less, or coarse aggregate for grouting cells / spaces greater than 75 mm (3″), Portland cement, Type I.

C101001 1.3.4 - Water

Water for mixing shall be potable.

C101001 1.3.5 - Anchors and Ties

Anchors and ties shall be galvanized per ASTM A 153/ A 153M, B-2. Rigid anchors shall be per ASTM A 568/ A 568M.

C101001 1.3.6 - Wire Ties

ASTM A 82, 4.8 mm (3/16″) diameter minimum.

C101001 1.3.7 - Horizontal Truss

ASTM A 82, minimum 9 gage longitudinal and 12 gage cross wires.

C101001 1.4 - GLASS MASONRY UNITS

Accomplish work in accordance with ASTM Standards as referenced. See Section B20, “Exterior Closure” for additional requirements.

C101001 1.4.1 - Glass Block Units

Provide glass block units made of clear colorless glass with polyvinyl butyral edge coating. Provide with 75 percent light transmission allowance.

C101001 1.4.2 - Mortar

ASTM C 270, Type S, white Portland cement.

C101001 1.4.3 - Aggregates

ASTM C 144, white quartzite sand, not less than 100 percent passing a No. 8 sieve.

C101001 1.4.4 - Horizontal Joint Reinforcing

ASTM A 82, fabricated from cold drawn steel wire, zinc-coated after fabrication by the hot-dip process conforming to ASTM A 153 / A 153M. Provide one longitudinal wire (minimum) for each face of glass block, out-to-out spacing approximately 37.5 mm (1 1/2 inches) less the actual width of the block.

C101001 1.4.5 - Panel Anchors

Galvanized strip anchors shall be not less than 20 gage, minimum 44.5 mm (1 3/4") wide by 600 mm (24 inches) long. Galvanized wire-type anchors shall be not less than 9 gage for use with the panel stiffener.

C101001 1.4.6 - Expansion Strip

Provide as recommended by the glass block manufacturer.

C101001 1.5 - COLD-FORMED METAL FRAMING

Install in accordance with ASTM C 1007.

C101001 1.5.1 - Load-Bearing Cold-Formed Metal Framing

Framing shall be designed in accordance with ASTM C 955.

C101001 1.5.2 - Studs

Galvanized steel, ASTM A 653 / A 653M, SS Grade 50, G60

C101001 1.5.3 - Framing Accessories

Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230Mpa). Accessories include, but are not limited to, the following: bracing, bridging, blocking, web stiffeners, end and foundation clips, gusset plates, stud kickers, knee braces, girts, joist hangers, reinforcing and backer plates.

C101001 1.5.4 - Plastic Grommets

Provide as recommended by stud manufacturer to protect electrical wires and to prevent metal-to-metal contact with plumbing pipes.

C101001 1.6 - METAL SUPPORT ASSEMBLIES

Accomplish work in accordance with ASTM Standards.

C101001 1.6.1 - Materials

Provide steel materials for metal support systems with galvanized coating per ASTM A 653/ A 653M, G60; aluminum coating ASTM A 463/ A 463M, T1-25; or a 55% aluminum-zinc coating.

C101001 1.6.2 - Suspended and Furred Ceiling Systems, and Wall Furring

ASTM C 841(for lath); ASTM C 645 (for GWB).

C101001 1.6.3 - Non-load-Bearing Wall Framing / Furring

ML/SFA MLF (for lath); ASTM C 645, but not thinner than 0.8357 mm (0.0329 inch) thickness (for GWB).

C101001 1.6.4 - Z-Furring Channels

Not lighter than 26 gage galvanized steel, Z-shaped, with 32 mm (1 1/4 inch) and 19 mm (3/4 inch) flanges, depth as required to support attached weight and to accommodate insulation thickness.

C101001 1.7 - ROUGH CARPENTRY

All framing and board lumber shall be graded and marked by a recognized association or independent inspection agency. Certification of grade is acceptable in lieu of grade markings.

C101001 1.7.1 - Moisture Content

Air-dry or kiln dry lumber as follows:

a. Framing lumber and boards – 19% maximum

C101001 1.7.2 - Fire-retardant Treatment

Comply with AWPA C20 or AWPA C27.

C101001 1.7.3 - Preservative Treated Lumber

Preservative treated lumber shall be in accordance with AWPA Standards.

C101001 1.7.4 - Plywood (Concealed)

C-D grade, exposure 1 durability classification, span rating of 24/16 or greater.

C101001 1.7.5 - Rough Hardware

a. Bolts, nuts and rivets per ANSI B18.2.1, ANSI B18.5.2.1M, ASME B18.5.2.2.2M, ASME B18.2.2, and ASTM A 687.

b. Expansion Shields per FS A-A-1923, FS A-A-1924, and FS A-A-1925; maximum size of 9.5 mm (3/8”).

c. Lag screws and bolts per ANSI B18.2.1

d. Toggle Bolts per FS FF-B-588

e. Wood Screws per ANSI B18.6.1

f. Wire Nails per ASTM F 1667

C101002 DEMOUNTABLE PARTITIONS

This paragraph covers all demountable partitions and associated work, including tracks and anchoring systems. Wall assemblies above demountable partitions shall provide a sound barrier equal to, or greater than, the sound rating of the partition.

C101002 1.1 - PERFORMANCE REQUIREMENTS

C101002 1.1.1 - Fire-Resistance Rating and Burning Characteristics

Fire resistance of the partitions shall be one-hour and in conformance with ASTM E 119. The system shall have a Class ‘A’ (under 25) flame spread rating in conformance with ASTM E 84.

C101002 1.1.2 - Acoustical Performance

Sound-rated partition assemblies shall have a minimum Sound Transmission Coefficient (STC) of 42 in accordance with ASTM E 90 or ASTM E 413 for frequency data.

C101002 1.1.3 - Structural Performance

Panel deflection shall not exceed $1/120^{th}$ of the vertical span when tested in accordance with ASTM E 72.

C101002 1.1.4 - Electrical Requirements

Demountable partitions shall accommodate electrical switches and outlets, and be tied to the building electrical power system through over-head or end-mount base feeds.

C101002 1.1.5 - Field Test

Perform a flashlight test of all joints in partitions and partition to wall, floor, and ceiling. No light from a flashlight shall be visible

from the opposite side of the partition. Adjust partition at locations where light is visible, and re-test.

C101002 1.2 - WIRE MESH PARTITIONS

Wire mesh partitions shall be heavy duty for extra heavy industrial use, complete with all items necessary for a useable and rigid installation, including doors. Provide pre-manufactured assemblies with pre-bolted connections. Extend wire mesh partitions meant for security purposes to the structural ceiling. Wire mesh partition doors require a means of locking. Key and cylinder locks are required for partition doors

C101002 1.2.1 - Materials

a. Steel shapes, plates and bars – ASTM A 36/A 36M.

b. Cold-formed steel – AISI SG-673.

c. Wire mesh – 10 gage mesh for seasonal storage, 6 gage mesh for protection of mobile equipment and tools. Carbon Steel Wire, woven diamond mesh, intermediate crimped.

C101003 RETRACTABLE PARTITIONS

This paragraph covers all retractable or folding partitions and associated work, including tracks and anchoring systems. Wall assemblies above retractable partitions shall provide a sound barrier equal to, or greater than, the sound rating of the partition.

C101003 1.1 - OPERABLE PANEL PARTITIONS

Panel partitions shall be factory finished, supported from an overhead track without floor guides, and complete with hardware, track, and accessories necessary for operation.

C101003 1.1.1 - Performance Requirements

C101003 1.1.1.1 - Fire Endurance

Provide fabric and lining with a flame spread rating of 25 or less, fuel contribution rating of 15 or less, and a smoke generation of 50 or less when tested in accordance with ASTM E 84. Partitions requiring 1-hour fire rating shall meet UL 10B, ASTM E 152, or NFPA 252.

C101003 1.1.1.2 - Acoustical Requirements

Partitions shall attain a Sound Transmission Class (STC) of not less than 45 in a fully extended position in accordance with ASTM E 90.

C101003 1.1.1.3 - Stain Resistance

Partition panels shall have a stain-resistant fabric finish such as Nanotex.

C101003 1.1.2 - Suspension System

Suspension system shall consist of steel or heavy duty extruded aluminum track connected to the structural system by threaded rods, and trolleys designed to support the weight of the partition. Provide a suspension system consisting of steel or aluminum track and trolleys designed to support the weight of the partition. Provide steel track of 16 gage minimum, phosphate treated and finished, or zinc or cadmium coated.

Provide extruded aluminum track with minimum thickness of 3.2 mm (1/8 inch). Tracks may have an integral ceiling guard. Trolleys shall have at least two ball bearing nylon or steel tired wheels spaced according to manufacturer's design criteria and four at an end post.

C101002 1.1.3 - Field Test

Perform a flashlight test of all joints in partitions and partition to wall, floor, and ceiling. No light from a flashlight shall be visible from the opposite side of the partition. Adjust partition at locations where light is visible, and re-test.

C101004 INTERIOR BALUSTRADES AND SCREENS

This paragraph covers assemblies to include balustrades (handrails and the row screens that support them) and screens and associated work to include tracks and anchoring systems.

C101004 1.1 - MATERIALS

C101004 1.1.1 - Structural Carbon Steel

ASTM A 36/ A 36M

C101004 1.1.2 - Structural Tubing

ASTM A 500

C101004 1.1.3 - Steel Pipe

ASTM A 53, Type E or S, Grade B

C101004 1.1.4 - Anchor Bolts

ASTM A 307

C101004 1.1.5 - Aluminum Alloy products

Products shall conform to ASTM B 209 for sheet plate, and ASTM B 221 for extrusions, and ASTM B 26/B 26M or ASTM B 108 for castings, as applicable.

C101004 1.2 - FABRICATION FINISHES

C101004 1.2.1 - Galvanizing

Hot-dip galvanize items to be zinc-coated, after fabrication where practicable. Galvanize per ASTM A 123/ A 123M, ASTM A 153/ A 153M or ASTM A 653/ A 653M, G90, as applicable.

C101004 1.2.2 - Non-Ferrous Metal Surfaces

Protect by plating, Class I anodic coatings, or 70% polyvinylidene fluoride organic coatings. See Section C30 for additional coatings/finish information.

C101004 1.3 - HANDRAILS

Design handrails to resist a concentrated load of 113.4 kg (250 lbs) in any direction at any point of the top of the rail or 22.7 kg per 305 mm (50 lbs per foot) applied horizontally to top of the rail, whichever is more severe. NAAMM PR, provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts.

C101005 INTERIOR WINDOWS

This paragraph covers fixed interior windows. Assemblies include frames, glazing, caulking, and other associated work. For other window types, see Section B20 Exterior Closure. Glazing for windows specified under this section is located in C101007, “Interior Glazing.”

C101005 1.1 - ALUMINUM WINDOWS

Each window unit shall be a complete factory assembled unit with or without glass installed. Fabrication of window units shall comply with AAMA 101.

C101005 1.1.1 - Fixed Windows

Type F- HC40

C101005 1.1.2 - Sliding Glass Pass Windows

Frames and glass channels shall be of heavy type 6063-TS aluminum extrusions. Provide 6.35 mm (1/4-inch) clear tempered glass.

C101005 1.2 - FINISHES

C101005 1.2.1 - Organic Coating

Provide a high performance coating in accordance with AAMA 2605 with a total dry film thickness not less than .03mm (1.2 mils).

C101005 1.3 - PROVISIONS FOR GLAZING

Provide windows and rabbets suitable for specified glass thickness. Nominal edge bite shall be 9.5 mm (3/8 inch) for structurally glazed window system and 25 mm (1 inch) bite for window systems that are not structurally glazed. Provide sash for glazing and for securing glass with [metal beads] [glazing clips] [glazing channels] and glazing compound.

C101005 1.4 - FINISHES

Exposed aluminum surfaces shall be finished as specified in Section C10, “Finishes.”

C101007 INTERIOR GLAZING

ASTM C 1036, unless specified otherwise. Provide wire glass where required for fire rated windows. Provide patterned glass where required to obscure view into bathrooms and dressing rooms. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

Provide setting and sealing materials, stops and gaskets as recommended by the glass or acrylic sheet manufacturer.

Provide warranty for polycarbonate sheet glazing for a period of 5-years against breakage, coating delamination, and yellowing.

Glazing thickness indicated in the following paragraphs is the minimum acceptable thickness. Provide thicker glazing if required by the manufacturer for the given application.

C101007 1.1 - GLASS

C101007 1.1.1 - Clear Glass

Type I, class I (clear), quality q4 or q5 for patterned glass.

C101007 1.1.2 - Wire Glass

Provide glazing of Type II, Class I, Form I, Quality q8 mesh stainless steel, diamond pattern, 6.35 mm (1/4 inch) thick, in doors and windows of fire-rated assemblies. Glass shall comply with ASTM E 163.

C101007 1.1.3 - Laminated Glass

Fabricate from two pieces of Type I, Class 1, quality q3 glass laminated together with a clear, 0.75 mm (0.030 inch) thick polyvinyl butyral interlayer. Total thickness shall be nominally 6.35 mm (1/4 inch).

C101007 1.1.4 - Tempered Glass

ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (clear), quality q3.

C101008 JOINT SEALANT

C101008 1.1 - JOINT SEALANTS

C101008 1.1.1 - Vertical Surfaces

ASTM C 920, Type M, Grade NS, Class 25, Use NT.

C101008 1.1.2 - Horizontal Surfaces

ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T.

C1020 INTERIOR DOORS

Door hardware shall be as specified in Section C10, “Interior Door Hardware.”

C102001 STANDARD INTERIOR DOORS

This paragraph covers all standard interior wood or hollow metal doors with frames, hardware, locks, finish, etc.

C102001 1.1 - STEEL DOORS

Hardware preparation shall be in accordance with SDI 17, ANSI/DHI A115 and ANSI/SDI 100. Doors shall be hung in accordance with ANSI/SDI 100.

C102001 1.1.1 - Standard Steel Doors

ANSI A 250.8, Level 2,(low use, moderate abuse types such as office/storeroom doors); and Level 4,(high use, high abuse types such as corridors, stairways, assembly spaces, and main entry doors), with a physical performance level of ‘A’. Maximum door undercut shall not exceed 19 mm (3/4 inch).

C102001 1.1.2 - Sound Insulated Doors and Frames

Provide sound insulated door and frame assemblies into rooms requiring wall assemblies to be sound insulated with a Sound Transmission Class (STC) rating as required. The STC rating for the door and frame assembly shall be not less than the wall assembly STC rating.

C102001 1.1.3 - Accessories

a. Louver shall comply with SDI 111-C, shall be stationary, sight-proof type. Use lightproof louvers if function of room requires

darkness. Louver frames shall be 20-gage steel with louver blades minimum 24 gage.

b. Astragals for pairs of fire rated or smoke control doors, provide stainless steel astragals complying with NFPA 80 for fire-rated assemblies and NFPA 105 for smoke control assemblies.

C102001 1.1.4 - Standard Steel Frames

ANSI A 250.8. Form frames with welded corners for installation in masonry partitions and knock-down field assembled corners for installation in metal stud and GWB partitions. Frames shall be set in accordance with SDI 105.

C102001 1.1.4.1 - Stops and Beads

Form stops and beads of 20 gage steel.

C102001 1.1.4.2 - Anchors

Provide a minimum of three jamb anchors and base steel anchors per frame, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud Partitions: Weld or otherwise securely fasten anchors to backs of frames.

c. Completed Openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI 111-F.

d. Provide mortar infill of frames in masonry walls, and gypsum board compound at each jamb anchor in metal frame walls.

C102001 1.1.5 - Fire and Smoke Doors and Frames

NFPA 80 and NFPA 105.

C102001 1.1.5.1 - Labels

Fire doors and frames shall be labeled (per UL, FM, or WHI) attesting to their required rating in accordance with testing per NFPA 252 or UL 10B (for neutral pressure) or UL 10C (for positive pressure).

C102001 1.1.5.2 - Finishes

a. Factory-Primed Finish
Doors and frames in non-humid, non-corrosive environments shall be factory primed with a rust inhibitive coating as specified in ANSI A 250.8.Factory prime doors on six sides of the door.

b. Zinc-Iron Alloy Coating (Galvanealed) and Factory Primed Finish
Fabricate interior doors and frames (for installation in such rooms as kitchens, laboratories, battery charging, utility rooms and bathroom / shower areas, areas with frequent floor mopping, or corrosive chemical atmospheres) from zinc coated steel, alloyed type, complying with ASTM A 653/ A 653M. Factory prime doors and frames as specified in ANSI A 250.8.

c. Manufacturers primer shall be compatible with door finish system in C30, “Interior Finishes”.

C102001 1.2 - WOOD DOORS

Solid wood doors with wood core and solid wood edge bands. Vertical edge bamds shall be one piece or laminated two-piece solid lumber to match face veneer species for natural finish wood doors. Reinforce door at all hardware attachments to door with sound grade hardwood. Utilize wood indigenous to the project site, and supplied from a source within a 150-km radius of the site or from a "managed forest".

C102001 1.2.1 - Flush Doors

Flush doors shall conform with WDMA I.S.-6.

C102001 1.2.1.1 - Interior Flush Doors

Provide staved lumber, structural composite core or particle board core construction. Provide hardwood or softwood veneers cut for the best presentation for natural finishing of doors. Set match veneers of all components of a door opening. Face veneers shall be 1/20″ thick before sanding.

C102001 1.2.2 - Acoustical Doors

WDMA I.S 1-A, solid core, constructed to provide a Sound Transmission Class (STC) rating of 35 (min.) when tested in accordance with ASTM E 90.

C102001 1.2.3 - Composite Type Fire Doors

Doors required to have a fire-resistance rating shall conform to the requirements of UL 10B (for neutral pressure) or UL 10C (for positive pressure), ASTM E 152, and NFPA 252.

C102001 1.2.4 - Wood Door Accessories

C102001 1.2.4.1 - Door Louvers

Door louvers shall be of the manufacturer’s standard design and shall transmit a minimum of 35 percent free air. Louver shall comply with SDI 111-C, shall be stationary, sight-proof type. Use lightproof louvers if function of room requires darkness. Louver frames shall be 20-gage steel with louver blades minimum 24 gage.

C102001 1.2.4.2 - Door Light Openings

Provide glazed openings with the manufacturer’s standard wood moldings. Moldings for doors to receive a natural finish shall be of the same specie and color of the face veneer.

C102001 1.2.5 - Fabrication

C102001 1.2.5.1 - Marking

Each door shall bear a stamp, brand or other identifying mark indicating quality and construction of the door.

C102001 1.2.5.2 - Adhesives and Bonds

WDMA I.S. 1-A. Use Type I adhesive for assembly of interior doors. Adhesive for doors to receive a natural finish shall be non-staining. Type II (water resistant) is allowed for fabrication of core parts. Adhesives used for fabrication of stiles, rails, crossbands and veneers shall be Type I (water proof).

C102001 1.2.6 - Finishes

Unless required by the project program, typically provide natural finish wood doors.

C102001 1.2.6.1 - Factory Finish

Provide doors finished at the factory as follows: AWI Quality Standards Section 1500, specification for System No. 4 Conversion varnish alkyd urea or System No. 5 Vinyl catalyzed. The coating shall be AWI Quality Standards premium, medium rubbed sheen, with an open or closed grain effect. Poly-wrap at factory for shipping.

C102001 1.2.6.2 - Field Finish

Prepare doors in accordance with WDMA I.S.1-A. Factory prime or seal doors on six sides of the door. Manufacturers primer or sealer shall be compatible with door finish system in Section C30, “Interior Finishes.”

C102003 FIRE DOORS

This paragraph covers all interior fire doors, including all necessary frames, hardware, closing devices, and alarms associated with the door.

C102003 1.1 - FIRE AND SMOKE DOORS AND FRAMES

Provide in conformance with NFPA 80 an NFPA 105. Fire doors and frames shall bear the label of UL, FM or WHI attesting to the rating required. Testing for conformance shall be per NFPA 252 or UL 10B. See Section C102001 for additional requirements.

C102007 INTERIOR DOOR HARDWARE

C102007 1.1 - DOOR HARDWARE

Provide the services of a certified hardware consultant to prepare the hardware schedule. Provide, as far as feasible, locks, hinges, pivots, and closers of one lock, hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

C102007 1.1.1 - Quality Assurance

Provide, as far as possible, door hardware of one manufacturer’s make. All door hardware shall be clearly and permanently marked by the manufacturer, on a location to be visible after installation.

C102007 1.1.2 - Hardware for Fire Doors

All hardware provided shall meet the requirements of NFPA 80 for Fire Doors and NFPA 101 for exit doors. Hardware shall bear the label of Underwriter’s Laboratories, Inc., and be listed in UL BMD or labeled and listed by another testing laboratory acceptable to the contracting officer.

C102007 1.1.3 - Hinges

BHMA A156.1, Grade 1, 108 x 108 mm (4 1/2 x 4 1/2 inches) with non-removable pin or anti-friction bearing hinges. Hinges shall have BHMA 652 (satin chromium plated) finish.

C102007 1.1.4 - Pivots

BHMA A156.4

C102007 1.1.5 - Locks and Latches

For non-residential buildings use Series 1000, Operational Grade 1, Security Grade 2 for stairways, corridors, assembly spaces, and other high use interior doors. Use Series 4000, Grade 1 for locations not using Series 1000 hardware. For residential buildings use Series 4000, Grade 2 for interior doors.

C102007 1.1.5.1 - Mortise Locks and Latches

BHMA A 156.13, Series 1000, Operation Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 175 by 57 mm (7 by 2 1/4 inches) with a bushing at least 6.35 mm (1/4-inch) long.

C102007 1.1.6 - Exit Devices

BHMA A 156.3, Grade 1. Touch bars shall be provided in lieu of conventional crossbars and arms. Use manufacturer’s integral touch bars in aluminum storefront doors.

C102007 1.1.7 - Exit Locks with Alarm

BHMA A 156.5.

C102007 1.1.8 - Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Cylinders and cores shall have seven pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets shall have interchangeable cores, which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

C102007 1.1.9 - Keying System

Provide a master key system for the facility. Provide construction interchangeable cores when subcontractors require keys during construction. Provide key cabinet as specified.

The Contractor shall coordinate a keying system meeting. The Contractor’s Project Manager, Superintendent, Hardware Subcontractor, Electrical Subcontractor (if keying hardware is electric), Designer of Record, Contracting Officer, Public Works Base Hardware Specialist, and the Using Activity shall attend this meeting to establish the keying system for the project. This meeting is intended to identify base limitations, the necessary security, and access control within the facility. The meeting shall produce a marked up copy of the floor plan indicating the doors to receive locks and the doors to be keyed together, and any master keying or grand master keying

C102007 1.1.10 - Keys

Furnish one file key, one duplicate key and one working key for each key exchange and for each master keying system.

C102007 1.1.11 - Lock Trim

Cast, forged or heavy wrought construction and commercial plain in design.

C102007 1.1.11.1 - Knobs and Roses

Knobs and roses shall meet test requirements of BHMA A 156.2 and BHMA A 156.13.

C102007 1.1.11.2 - Lever Handles

Provide lever handles in lieu of knobs as required by UFAS and ADAAG. Lever handles shall meet the test requirements of BHMA A 156.13 for mortise locks.

C102007 1.1.12 - Door Bolts

BHMA A 156.16. Automatic latching flush bolts: BHMA A 156.3, Type 25.

C102007 1.1.13 - Closers

BHMA A 156.4, Series C02000, Grade 1, with PT 4C, with full size cover.

C102007 1.1.14 - Overhead Holders

BHMA A 156.8, Grade 1

C102007 1.1.15 - Closer Holder-Release Devices

BHMA A 156.15, Grade 1

C102007 1.1.16 - Door Protection Plates

Provide armor, mop, and kick plates conforming to BHMA A 156.6. Provide door kick plates on all doors with closers and doors leading to corridors or circulation spaces. Provide armor plates on all doors that receive cart traffic. Provide mop plates on all doors in rooms that have a mop-able floor finish.

C102007 1.1.17 - Edge Guards

BHMA A 156.6, stainless steel.

C102007 1.1.18 - Door Stops and Silencers

BHMA A 156.16. Provide silencers, Type L03011, three per single door and four per double door.

C102007 1.1.19 - Thresholds

BHMA A 156.21

C102007 1.1.20 - Door Gasketing

BHMA A 156.22. Use light-proof gasketing for room functions that require darkness and integral sound-proof gasketing on acoustically rated doors.

C102007 1.1.21 - Finishes

Provide one of the following hardware finish systems, matching the exterior hardware finish system.

a. BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closers which shall have aluminum paint finish, and except steel hinges which shall have BHMA 652 finish (satin chromium plated).

Hinges for exterior doors shall be stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Exit devices may be provided in BHMA 626 finish in lieu of BHMA 630 finish except where BHMA 630 is specified under paragraph entitled "Hardware Sets". Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

b. BHMA A156.18. Hardware shall have BHMA 612 finish (satin bronze), unless specified otherwise. Surface door closers shall have bronze paint finish. Steel hinges shall have BHMA 639 finish (satin bronze plated). Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors. Hardware showing on interior of bathrooms, shower rooms, toilet rooms, washrooms, laundry rooms, and kitchens shall have BHMA 629 finish (bright stainless steel) or BHMA 625 finish (bright chromium plated).

C102007 1.1.22 - Key Cabinet and Control System

BHMA A 156.5 Provide 25% more key hooks than required for interior and exterior doors.

C102098 OTHER INTERIOR SPECIALTY DOORS

Provide manufactured access doors and frames of 16-gage steel minimum with concealed pivots or a continuous piano hinge and flush stainless steel cam latch. Finish with manufacturer’s standard primer coat finish and paint to match the wall or ceiling unless a stainless steel finish is required in the Project Program. For access doors in fire rated assemblies, provide UL Rated access doors equivalent to the rated assembly the door is installed in. Access panels located in furred wall spaces shall have an inserted material to match adjacent wall surface. Size access doors large enough to allow convenient hand and tool access and operation of controls and equipment beyond the door. If maintenance of controls or equipment beyond the door requires removal, size access door to allow removal and reinstallation of new equipment through the access door.

C102098 1.1 - ACCESS DOORS

Provide access doors and frames of 16-gage steel with concealed pivots or a continuous piano hinge and flush stainless steel cam latch. Finish with manufacturer’s standard primer coat finish. For access doors in fire rated assemblies, provide UL Rated access doors equivalent to the rated assembly the door is installed in. Access panels located in furred wall spaces shall have an inserted material to match adjacent wall surface.

C1030 FITTINGS

C103001 COMPARTMENTS, CUBICLES AND TOILET PARTITIONS

This paragraph covers assemblies for individual compartments, cubicles, toilet partitions and urinal screens.

C103001 1.1 - TOILET PARTITIONS

FS A-A-60003. Provide toilet compartments at multi-fixture toilet rooms of Type I, Style C-Overhead Braced. Reinforce panels to receive partition-mounted accessories. Toilet partitions shall have a recovered materials content of 20 to 30 percent in accordance with the Environmental Protection Agency (EPA) recommendations.

C103001 1.2 - URINAL SCREENS

FS A-A-60003. Type III, Style D, wall hung. Wall hung urinal screens shall be secured with continuous flanges to urinal screen and wall.

C103001 1.3 - HARDWARE AND FITTINGS

Stainless steel door latches and coat hooks. Latches and hinges for handicapped compartments shall comply with ATBCB ADA TITLE III. Provide integral hinges and concealed fasteners.

C103001 1.4 - FINISHES

Finishes shall comply with FS A-A-60003.

a. Solid plastic partitions shall be fabricated of polymer resins (polyethylene) formed under high pressure forming a single component section one inch thick. Color shall extend throughout the panel thickness

C103001 1.4.1 - Recovered Materials

Steel and plastic toilet partitions shall have a minimum recovered material content of 20 to 30 percent in accordance with Environmental Protection Agency (EPA) recommendations.

C103002 TOILET AND BATH ACCESSORIES

This paragraph covers toilet and bath accessories to include soap dispensers, paper holders, towel receptacles, grab bars, bathroom mirrors, etc.

C103002 1.1 - TOILET AND BATH ACCESSORIES

C103002 1.1.1 - Finishes

Finishes on metals not specified otherwise shall be provided as follows:

Corrosion-resisting Steel (Stainless Steel)	General-purpose Polished
Aluminum	Satin Anodic, Clear
Carbon Steel	Bright Chromium Plate
Copper Alloy (Brass)	Bright Chromium Plate
Zinc Alloy	Bright Chromium Plate

C103002 1.2 - MANUFACTURED UNITS

C103002 1.2.1 - Toilet Tissue Dispensers

FS A-A-2524. Provide units, Type I, II, or III, of stainless steel. Provide one double-roll dispenser per toilet compartment, unless otherwise indicated.

C103002 1.2.2 - Paper Towel Dispensers

FS A-A-2380. Provide one per pair of sinks in toilet rooms without electric hand dryers, and one per room with electric hand dryers, unless otherwise indicated.

C103002 1.2.3 - Combination Paper Towel Dispenser / Waste Receptacle

Provide a recessed or semi-recessed type with a capacity of 600 sheets of any type of paper towels. The waste receptacle shall have a capacity of 45.42 liters (12 gallons), and be constructed of 22-gage stainless steel. Provide one per pair of sinks, unless otherwise indicated.

C103002 1.2.4 - Sanitary Napkin Dispenser

Surface or recess mounted unit formed from corrosion resistant steel with a polished stainless steel finish. Provide one per Women's Toilet Room, unless otherwise indicated.

C103002 1.2.5 - Sanitary Napkin Disposal Units

Units shall be toilet partition or wall mounted of not less than 22 gage stainless steel, with top and bottom hinged access doors. Provide one in each Women's toilet stall, unless otherwise indicated.

C103002 1.2.6 - Towel Bars

Provide stainless steel towel bars with a minimum thickness of 0.4 mm (0.015 inch).

C103002 1.2.7 - Grab Bars

Provide stainless steel grab bars per Building Code, with concealed fasteners, and capable of withstanding a static load of 113.4 kg (250 pounds) on any point.

C103002 1.2.8 - Robe Hooks

Provide two hooks with integral wall flange, with a projection not less than 41 mm (1 5/8 inches).

C103002 1.2.9 - Mirrors

Class 2, Style E, Grade 1, electro-copper plated, conforming to FS DD-M-411. Provide one manufactured framed mirror per sink, or one full-size mirror for all sinks, unless otherwise indicated.

C103002 1.2.10 - Soap Dispensers

Provide one soap dispenser per two sinks, lather dispersed by spring–action "push-in" valve. Do not mount soap dispenser on mirror.

C103002 1.2.11 - Electric Hand Dryer

FS W-H-50. Provide one unit per three sinks, unless otherwise indicated.

C103003 MARKER BOARDS AND TACK BOARDS

This paragraph covers all marker boards, tack boards and fastening devices.

C103003 1.1 - MATERIALS

C103003 1.1.1 - Porcelain Enamel

Marker board writing surface shall be composed of porcelain enamel fused to a nominal 28 gage thick steel sheet, laminated to a 6.35 mm (1/4-inch) thick core material with a steel or foil backing sheet.

Provide one Manufacturer's Starter Kit per board. Each kit shall include magnets, markers and cleaner.

C103003 1.1.2 - Cork

Cork shall be a continuous resilient sheet made from soft, clean, granulated cork, relatively free from hardback and dust and bonded with a binder suitable for the intended purpose. The cork sheet shall have a tensile strength of not less than 275.8 kPa (40 PSI) when tested in accordance with ASTM F 152. Linoleum (6mm thick) bulleting boards are an acceptable alternate for cork boards. When located in the same room as a marker board, the frame of the cork board shall match the frame of the marker board.

C103003 1.1.3 - Tack-board Covers

Provide woven fabric or vinyl wall covering over cork tack surface. Covers shall have a Class 'A' flame spread rating of 0-50, and a smoke developed rating of 0-450 in accordance with ASTM E 84.

C103003 1.1.4 - Aluminum

Aluminum frame extrusions shall be alloy 6063-T5 or 6063-T6, conform to ASTM B 221, and be a minimum of 1.5 mm (0.06 inches) thick.

C103004 IDENTIFYING DEVICES

This paragraph covers all signs, plaques, traffic markers, etc.

C103004 1.1 - ASSEMBLIES

The signage system assemblies shall consist of three primary elements; a structural rail (with coordinating rail joiners to increase sign height in the field), removable copy inserts, and interlocking end caps or frame, and trim.

C103004 1.1.1 - Inserts

The signage rails shall be designed as to accept ABS plastic signage inserts.

C103004 1.1.1.1 - Insert Fabrication

The insert is the signage member to which message signage copy in the form of letters, numbers, and/or symbols shall be applied, and shall be interchangeable with similar sized rails of any other sign of equal or greater width and height. The ends of the rail and insert assembly shall be enclosed by end caps of prefinished 6064T5 extruded aluminum. Inserts shall be fabricated from 0.090 minimum ultra-violet resistant thickness extruded ABS Acrylic sheet core with 20.003 polycarbonate non-glare clear cap bonded to the core during the extrusion texturing process.

C103004 1.1.2 - End Caps

End caps shall be injection-molded ABS plastic with integral color. The end caps shall be interchageable to either end of each sign type, and any other similar sign of equal height. The end caps shall be interlocking mechanically with the inserts, and rail, requiring no tools for assembly. End caps shall utilize straight corners (instead of radius corners). Spring clips shall be steel. Plastic spring clips are not acceptable.

C103004 1.1.3 - Trim

Optional accessory top and bottom trim frames of prefinished (color as indicated 6063T5 extruded aluminum shall be provided to the signage types indicated.

C103004 1.1.4 - Mounting

Mounting of the modular signage system shall include surface mounting with screw-on applications for interior and exterior walls and on selected doors as indicated, at the locations indicated, and other mounting devices as

C103004 1.1.5 - Graphics Application

C103004 1.1.5.1 - Tactile Letters and Symbols

Chemically weld tactile letters and symbols to front surface of signage inserts where indicated and where required by ATBCB ADA TITLE III. Tactile letters and symbols shall be sized as indicated.

C103004 1.1.5.1 - Braille

Grade II Braille. Provide Grad II Braille inlaid strip as indicated to match sign color.

C103004 1.2 - ALUMINUM ALLOY PRODUCTS

Provide ASTM B 209 for aluminum sheet or plate, ASTM B 221 for aluminum extrusions and ASTM B 26/B 26M or ASTM B 108 for aluminum castings. Provide aluminum extrusions at least 3.2 mm (1/8-inch) thick and aluminum plate or sheet at least 16 gage thick. Provide aluminum castings of solid aluminum cast certified by AA 46 alloy designation B443.0. Where anodic coatings are specified, alloy shall conform to Aluminum Association’s alloy designation 514.0 or A514.0.

C103004 1.2.1 - Aluminum Finishes

Provide exposed aluminum finishes with either mill finish, factory finished with anodic coating or organic coating. Anodized finishes shall conform to AA 45, Architectural Class I or II, with a coating thickness 0.7 mil or thicker. Organic coatings shall be a baked enamel finish with a dry film thickness not less than 1.2 mils, conforming to AAMA 605.2.

C103004 1.3 - STEEL PRODUCTS

Provide ASTM A 36/A 36M for structural steel, ASTM A 167 for sheet and plates.

C103004 1.4 - CAST METAL

C103004 1.4.1 - Cast Aluminum

ASTM B 108

C103004 1.5 - FIBER-REINFORCED POLYESTER (FRP)

ASTM D 3841, Type II, Grade 1

C103004 1.6 - ACRYLIC SHEET

ASTM D 4802, Type III

C103004 1.7 - POLYCARBONATE SHEET

SAE AMS 3611

C103004 1.8 - ANCHORS AND FASTENERS

C103004 1.8.1 - Expansion Shields

Shields shall be not less than 63.5 mm (2 1/2 inches) into the concrete or masonry.

C103004 1.8.2 - Lag Screws and Bolts

ANSI B18.2.1

C103004 1.8.3 - Bolts, Nuts Studs and Rivets

ANSI B18.2.1 or ANSI B18.7.

C103004 1.8.4 - Powder Driven Fasteners

When permitted by ANSI A10.3, follow applicable safety provisions.

C103004 1.8.5 - Screws

ANSI B18.2.1, ANSI B18.6.1, ANSI B18.6.2, and ANSI B18.6.3.

C103004 1.9 - EXTERIOR POST AND PANEL SIGNS

C103004 1.9.1 - Posts and Panels

Provide one-piece extruded aluminum posts with not less than 3.2 mm (0.125 inch) wall thickness. Posts shall permit attachment of panel framing system. Provide cap for each post. Panel framing system shall consist of aluminum extrusions and interlocking track components designed to interlock with concealed fasteners. Panels shall be fabricated of rectangular extruded tubular aluminum with a minimum wall thickness of 0.125 inches. Panels shall be removable and interchangeable. Posts shall be embedded in solid concrete foundation.

C103004 1.9.2 - Illumination

Provide concealed lighting within panel framing members. Provide T-12 slim-line lamps per Section D50 of this RFP.

C103005 LOCKERS

This paragraph covers all types of metal lockers, single or double tier, with special bases included.

C103005 1.1 - STEEL CLOTHING LOCKERS

C103005 1.1.1 - Single Tier Units (unless multi-tier permitted by Project program)

FS AA-L-00486 (Rev. J), enameled steel

C103006 SHELVING

This paragraph covers all types of shelving with brackets and all supporting materials and associated finishes.

C103006 1.1 - STEEL SHELVING

ANSI MH28.1

C103006 1.1.1 - Manufactured Units

Provide heavy-duty type steel shelving units. Provide wall connections for units over 2438 mm (8 feet) tall to top shelf. Provide floor and wall anchorages for units in Seismic zones 3 or 4, and door and drawer earthquake stops.

C103006 1.1.2 - Accessories

a. Partitions and dividers

b. Label holder

C103006 1.1.3 - Finish

Provide shelving units with electro-statically applied enamel finish coat. Coating shall meet ASTM D 522, Method A, for Finish Flexibility; ASTM D 3359, Method B, for Finish Adhesion; and ASTM D 2794, for Impact Resistance.

C103007 FIRE EXTINGUISHER CABINETS

This paragraph covers all types and sizes of fire extinguisher cabinets. Fire extinguishers size and type must be coordinated with the base Fire Department.

C103007 1.1 - FIRE EXTINGUISHER CABINET

Cabinet shall be constructed of 16 gauge cold-rolled steel door panel / front, and a 22 gauge cold-rolled steel tub. Cabinet shall be fire-rated if located in a fire rated wall assembly, and have a full-length piano hinge, and baked enamel finish. Provide a stainless steel cabinet door if cabinet is exposed to the environment.

C103008 COUNTERS

This paragraph covers all counters and counter tops, with all necessary brackets, supporting materials, and finish.

C103008 1.1 - ACRYLIC COUNTER TOPS

Provide 100% acrylic counter tops.
Solid surfacing material shall consist of 100% pure acrylic polymer, mineral fillers, and pigments. The material shall be homogenous, not coated or laminated. Superficial damage to a depth of .254mm (0.010 inch) shall be repairable by sanding or polishing. Provide the following performance characteristics:

a. Tensile strength, ASTM D 638: 5800 psi minimum

b. Hardness, ASTM D 2583: Barcol Impressor 55 minimum

c. Flammability, ASTM E 84: Class I/A, flame spread 25 maximum; smoke developed 30 maximum

d. Thermal Expansion, ASTM D 696:.00002 in/in/F maximum

e. Boiling water resistance, NEMA LD 3: No effect

f. High temperature resistance, NEMA LD 3: No effect

g. Liquid absorption, ASTM D 570 (24 hours): 0.10 percent maximum

h. Mold and mildew growth, ASTM G 21: No growth, no effect

i. Bacteria growth, ASTM G 22: No growth, no effect

j. Sanitation, NSF 51: "Food Contact" approval for food area applications

k. Impact resistance, NEMA LD 3 (1/2 lb. ball drop): 1/4 inch material, 36 inch drop, no failure 1/2 inch material, 120 inch drop, no failure

C103008 1.1.1 - Application

Provide solid surfacing with factory recommended fasteners/adhesives/caulk to complete the installation.

C103009 CABINETS

This paragraph includes casework items that are permanently fixed in-place. Included are all cabinetry and millwork items with their associated accessories and anchoring devices.

C103009 1.1 - WALL AND BASE CABINETS

Provide natural factory finish wall and base cabinets. Drawers and drawers to be full overlay solid wood construction with heavy-duty concealed European-style hinges. Drawers shall be dovetail construction with full-extension stainless steel ball bearing glides. The wood grain shall be minimal in appearance with a grade A cut. Cabinets shall be constructed with hardwood plywood. Cabinet interiors may laminate. Particle board and MDF will not be accepted. Extended stiles shall be covered with a matching wood fillers and exposed cabinet sides shall match cabinet face. Wall cabinets shall be 42″ high with drywall soffits above. Doors and drawers shall have 4″ long stainless steel cylindrical pulls or 2-1/2″ long stainless steel cantilevered finger pulls.

C103009 1.1.1 - Quality Standards

Wall and base cabinets shall be constructed to meet “Custom” quality grade as defined in AWI Quality Standards.

C103009 1.1.2 - Hardware

Provide cabinet hardware including two self-closing hinges for each door and two side-mounted metal drawer slides for each drawer and pulls for all doors and drawers as follows. All cabinet hardware exposed to view shall be ANSI/BHMA 156.9, Grade 1, and comply with the following requirements:

a. Concealed Euro-Style, back mounted hinges with opening to 165 degrees and a self-closing feature at less than 90 degrees.

b. Drawer slides shall have a static rating capacity of 100 lbs. (444N).

c. Drawer catch shall be heavy-duty magnetic latch.

C103009 1.1.3 - Finish

Provide or transparent finish with sealer and varnish as selected by Designer of Record.

C103011 FIRESTOPPING PENETRATIONS

This paragraph covers fire-stopping assemblies to include sleeves, caulking and flashing. See Section D40, “Fire Protection” for additional requirements.

C103011 1.1 - FIRESTOPPING

Provide asbestos-free firestopping material capable of maintaining an effective barrier against flame, gases and temperature. Provide non-combustible firestopping that is non-toxic to human beings during installation or during fire conditions. Devices and equipment for firestopping service shall be UL FRD listed or FM P7825 approved for use with applicable construction, and penetrating items.

C103011 1.1.1 - Fire Hazard Classification

Material shall have a flame-spread of 25 or less, a smoke developed rating of 50 or less when tested in accordance with UL 723 or UL listed and accepted.

C103011 1.1.2 - Firestopping Rating

Firestopping materials shall be UL FRD listed or FM P7825 approved for “F” and “T” ratings at least equal to the fire-rating of the fire wall in which penetrated openings are to be protected.

C103012 SPRAYED FIRE-RESISTIVE MATERIALS

See Section D40, “Fire Protection” for additional requirements.

C103012 1.1 - SPRAYED FIRE-RESISTIVE MATERIALS

C103012 1.1.1 - Quality Assurance

A pre-installation conference shall be held with the manufacturer’s approved installer prior to the application of the sprayed fire-resistive materials. A qualified testing and inspection agency shall be engaged to prepare testing and adhesion reports to test for bond strength. Bond strength shall be tested per ASTM E 736 and be found to meet the requirements in UL’s “Fire Resistance Directory” for coating materials. When tested for Fire-Test-Response Characteristics, material shall be found to meet ASTM E 119. Products provided shall not contain asbestos per 40 CFR 763.

C103012 1.1.2 - Warranty

Contractor shall provide manufacturer’s standard materials and workmanship warranty stating that the manufacturer agrees to repair or replace materials that fail within 5 yearsfrom date of Substantial Completion.

C103012 1.1.3 - Material Composition

Provide sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or Portland cement binders and light-weight mineral or synthetic aggregates mixed with water at the Project site, or provide sprayed-fiber fire-resistive material consisting of factory-mixed, dry formulation of inorganic binders, mineral fibers, fillers, and additives conveyed in a dry state by pneumatic equipment and mixed with water at a spray nozzle to form a damp, as-applied product.

C103012 1.1.4 - Physical Properties

a. Dry Density: 240 kg/cubic meter (15 lb/cubic foot) for referenced fire-resistance design to attain the ratings indicated, per ASTM E 605.

b. Thickness: Provide minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 9 mm (0.375 inch), per ASTM E 605:

    1. Where the referenced fire-resistance design lists a thickness of 25 mm (1 inch) or greater, the minimum allowable individual thickness of sprayed fire-restive material is the design thickness minus 6 mm (0.25 inch).

    2. Where the referenced fire-resistance design lists a thickness of less than 25 mm (1 inch) but more than 9 mm (0.375 inch), the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 9 mm (0.375 inch) or 75 percent of the design thickness.

    3. No reduction in design thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 240 kg/cubic meter (15 lb/cubic foot).

c. Bond Strength: 7.2 kPa (150 lb/sq. ft.) minimum per ASTM E 736.

d. Compressive Strength: 35.9 kPa (5.21 lb/sq. in.) as determined per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 19 mm (0.75 inch) and minimum dry density shall be as specified, but not less than 240 kg/cubic meter (15 lb/cubic foot).

e. Corrosion Resistance: No evidence of corrosion per ASTM E 937.

f. Deflection: No cracking, spalling, or delamination per ASTM E 759.

g. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 759.

h. Air Erosion: Maximum weight loss of 0.270 g/sq. meter (0.025 g/sq. foot) in 24 hours per ASTM E 859.

i. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics per ASTM E 84 by United Laboratories: flame-spread index of 10 or less and a smoke developed index of 0.

j. Fungal Resistance: No observed growth on specimens per ASTM G 21.

C103099 OTHER INTERIOR SPECIALTIES

This paragraph covers other interior specialties not described by other assembly categories listed previously.

C103099 1.1 - PROJECTION SCREEN

Motorized projection screen shall be above ceiling mounting, and shall have a 120V motor that is lubricated for life, quick reversal type, has overload protector, integral gears, and preset accessible limit switches. Screen shall be flame retardant, mildew resistant and have black masked borders. Controls shall be wall mounted with wiring concealed within the wall construction.

C103099 1.2 - ENTRANCE MAT(S)

Provide entrance mat at all major entrances to the facility. Provide recessed entrance mats. Mat system shall meet ASTM D-2047 coefficient of friction requirements for dry and wet surfaces. Mat systems shall be securely fastened to prevent movement of mat while walking on mat surface. All portions of mat system shall comply with ASTM E 648, Class I for flammability and ASTM E 662 for smoke development of $\leq$ 450. Fasteners shall be non-corrosive screws and anchors for securing frames together to floors. Provide continuous vinyl bottom cushion to quiet clatter at recessed entrance mat systems. Hinges shall be flexible aluminum hinge retained in aluminum tread port, and allow debris and moisture to flow through recessed mat. Provide ball and socket hinge for easy roll-up of recessed mat inserts for cleaning. Recessed entrance mat systems shall use an aluminum framework and shall have replaceable wearing surface inserts.

C103099 1.2.1 - Aluminum Frame Requirements

Aluminum frame and rail shall comply with ASTM B 221, alloy 6063-T5. Frame shall have butted corners and be factory coated with zinc chromate or manufacturer's standard protective finish where surfaces are in contact with concrete. Provide standard mill finish, color anodized finish complying with AAMA 606.1, clear anodized finish complying with AAMA 607.1, or bronze complying with ASTM B455, alloy 385.

C103099 1.2.2 - Inserts

C103099 1.2.2.1 - Carpet Inserts

Carpet insert fiber shall be colorfast, solution dyed, anti-static, anti-microbial, and waterproof. Fiber shall be 100% nylon or polypropylene. Each carpet fiber shall be bonded to rigid ply backing to prevent fraying and supplied in continuous splice-free lengths. Carpet shall be minimum of 30-oz./yd^2.

C103099 1.2.2.2 - Rubber Inserts:

Rubber inserts shall be removable and be made from recycled materials wherever possible. Inserts shall have serrated edges for scraping purposed or flexible abrasive grit tape, bonded to a rigid insert.

C103099 1.3 OTHER INTERIOR SPECIALTIES

See Section C20 for additional interior specialties not specified here.

-- End of Section --

SECTION C20

STAIRS
07/04

C20 GENERAL

C20 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes all requirements for the provision of interior and exterior stairs, to include handrails, guardrails, and associated finishes.

C20 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web site. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

C20 1.2.1 - Industry Standards and Codes

International Building Code

Refer to UMRL for reference designation identification

C20 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

C20 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design”

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements,”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”.

Interior stair construction shall be in compliance with the International Building Code. For exterior stairs / steps, the treads and risers shall be designed to provide a comfortable progression along the run of the stair / steps.

C20 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

C20 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory exterior enclosure system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

C20 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

C20 1.6.1 - DESIGN SUBMITTAL SPECIFICATION

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

C20 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Reinforcing Steel; G

Fabrication Drawings of Steel Stairs; G

Handrails, Installation Drawings; G

SD-06, Test Reports

Submit manufacturer’s verification inspection documentation in accordance with applicable ASTM for galvanized metal; G

C2010 STAIR CONSTRUCTION

C201001 INTERIOR STAIR STRUCTURE

C201001 1.1 - STEEL STAIRS

Provide primed and painted steel stairs with concrete filled pans or cast-in-place concrete stairs for industrial and commercial construction. Provide steel guard and handrails.

C201001 1.1.1 - Materials

C201001 1.1.1.1 - Structural Carbon Steel

ASTM A 36/A 36M

C201001 1.1.1.2 - Structural Tubing

ASTM A 500

C201001 1.1.1.3 - Steel Pipe

ASTM A 47

C201001 1.1.1.4 - Gratings

a. Gray cast iron ASTM A 48, Class 40

b. Metal plank grating, non-slip requirement, FS RR-G-1602 aluminum ASTM B 209, 6061-T6; steel ASTM A 653/ A 653M, G90.

C201001 1.1.1.5 - Floor Plates, Patterned

ASTM A 786/A 786M, 14 gage.

C201001 1.1.1.6 - Anchor Bolts

ASTM A 307

C201001 1.1.1.7 - Expansion Anchors, Sleeve Anchors and Adhesive Anchors

Design values shall be as tested in accordance with ASTM E 488.

C201001 1.1.1.8 - Lag Screws and Bolts

ANSI B18.2.1

C201001 1.1.1.9 - Toggle Bolts

ANSI B18.2.1

C201001 1.1.1.10 - Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307

C201001 1.1.1.11 - Screws

ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3

C201001 1.1.1.12 - Washers

Washers shall conform to ASME B18.22.1.

C201001 1.2 - ALUMINUM ALLOY PRODUCTS

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108 for castings. Aluminum extrusions shall be at least 3.2 mm (1/8") thick and aluminum plate or sheet at least 1.27 mm (0.050 inch) thick.

C201001 1.3 - FINISHES

C201001 1.3.1 - Galvanizing

Hot-dip galvanizing: ASTM A 123/A123M, ASTM A 153/A 153M or ASTM A 653/A 653M, G90, as applicable.

C201001 1.3.2 - Aluminum Finishes

Protect by plating, Class I anodic coatings, or 70% polyvinylidene fluoride organic coatings. See Section C30 for additional coatings/finish information.

C201001 1.4 - HANDRAILS

Design handrails and anchorage connections to resist a concentrated load of 90.7 Kg (200 lbs) in any direction at any point of the top of the rail or 22.7 Kg force (50 lbs per foot) applied horizontally to top of the rail, whichever is more severe. NAAMM PR, provide the same size rail and post. Provide series 300 stainless steel pipe collars. Factory coat all metal railings, except for ornamental metals such as brass, bronze and nickel-silver. Coat handrails with a high performance coating in accordance with AAMA 2605 with a minimum coating thickness of 1.2 mils unless otherwise noted.

C201001 1.4.1 - Steel Handrails

Provide steel handrails, including inserts in concrete, steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Provide steel railings of 38 mm (1 1/2 inches) nominal size. Railings shall be hot-dip galvanized and shop painted for exterior applications and primed and shop painted for interior applications.

C201001 1.4.2 - Aluminum Handrails

Provide aluminum railing of 38 mm (1 1/2 inch) nominal schedule 40 pipe conforming to ASTM B 429 or 44 mm (1 3/4 inch) square aluminum semi-hollow tube with rounded corners conforming to ASTM B 221. Railings shall be coated with a high performance coating or anodized in accordance with AAMA 611, Class I. All fasteners shall be Series 300 stainless steel.

C201001 1.4.3 - Safety Treads

NAAMM BG steel, Type W (welded)

C201002 EXTERIOR STAIR STRUCTURE

C201002 1.1 - CONCRETE STEPS / STAIRS

Provide exterior concrete steps and stair with non-slip finish and cast-in-place abrasive nosing. Provide steel guard and handrails as necessary.

C201002 1.2 - MATERIALS

C201002 1.2.1 - Formwork

Use exterior grade plywood or steel formwork (where smooth finish is desired).

C201002 1.2.2 – Concrete

ACI 211.1, ACI 301/301M, and ACI 318/318M, with a compressive strength of 20,680 kPa (3,000 psi) or greater.

C201002 1.2.3 - Cement

ASTM C 150, Type I or II, or ASTM C 595, Type IP(MS) or IS(MS) blended cement.

C201002 1.2.4 - Water

Water shall be fresh, clean, and potable; free from substances deleterious to concrete.

C201002 1.2.5 - Aggregates

ASTM C 33

C201002 1.2.6 - Non-shrink Grout

ASTM C 1107

C201002 1.2.7 - Joint Sealants

For horizontal surfaces, use ASTM C 920, Type M, Class 25, Use T. For vertical surfaces, use ASTM C 920, Type M, Grade NS, Class 25, Use T.

C201002 1.3 - REINFORCEMENT

Bars, fabrics, connectors, and chairs shall be galvanized.

C201002 1.3.1 - Reinforcing Bars

ACI 301/301M

C201002 1.3.2 - Welded Wire Fabric

ASTM A 185 or ASTM A 497

C201002 1.3.3 - Safety Nosings for Concrete Treads

Provide safety nosings of cast aluminum with abrasive surfaces, or abrasive inserts.

C201002 1.4 - STEEL STAIRS

Provide primed and painted steel stairs with concrete filled pans. Provide steel guard and handrails. Design load shall not be less than 4.8 kPa (100 PSF) for live load, and 136 kg (300 pounds) for concentrated loads. Design shall conform to AISC S335 or AISC S342L. Fire stairs shall conform to NFPA 101.

C201002 1.5 - MATERIALS

C201002 1.5.1 - Structural Carbon Steel

ASTM A 36/A 36M

C201002 1.5.2 - Galvanized Structural Steel

All steel exposed to the environment or direct water contact shall be galvanized in accordance with ASTM A 123/A123M, ASTM A153/A153M, and ASTM A653/A653M, Z275 (G90) coating. Galvanize all components after fabrication in accordance with ASTM A385. Fabricate all steel components in the largest units practical using bolted connections for field assembly. Repair damage to, or voids in, galvanizing in accordance with ASTM A780, Annex A1 or Annex A3. Manufacturer's verification inspection documentation for applicable ASTM listed above shall be submitted with Contractor's quality control reports during erection or installation process.

C201002 1.5.3 - Structural Tubing

ASTM A 500

C201002 1.5.4 - Steel Pipe

ASTM A 47

C201002 1.5.5 - Gratings

a. Gray cast iron ASTM A 48, Class 40

b. Metal plank grating, non-slip requirement, FS RR-G-1602 aluminum ASTM B 209, 6061-T6; steel ASTM A 653/ A 653M, G90.

C201002 1.5.6 - Floor Plates, Patterned

ASTM A 786/A 786M, 14 gage.

C201002 1.5.7 - Anchor Bolts

ASTM A 307

C201002 1.5.8 - Expansion Anchors, Sleeve Anchors and Adhesive Anchors

Design values shall be as tested in accordance with ASTM E 488.

C201002 1.5.9 - Lag Screws and Bolts

ANSI B18.2.1

C201002 1.5.10 - Toggle Bolts

ANSI B18.2.1

C201002 1.5.11 - Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307

C201002 1.5.12 - Screws

ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3

C201002 1.5.13 - Washers

Washers shall conform to ASME B18.22.1.

C201002 1.5.14 - Safety Treads

NAAMM BG steel, Type W (welded)

C201003 CATWALKS

C201003 1.1 - STEEL STRUCTURE

Provide primed and painted steel stairs and platforms. Provide removeable aluminum guard and handrails where indicated. Design load shall not be less than 4.8 kPa (100 PSF) for live load, and 136 kg (300 pounds) for concentrated loads. Design shall conform to AISC S335 or AISC S342L. Fire stairs shall conform to NFPA 101.

C201003 1.2 - MATERIALS

C201003 1.2.1 - Structural Carbon Steel

ASTM A 36/A 36M

C201003 1.2.2 - Galvanized Structural Steel

All steel shall be galvanized in accordance with ASTM A 123/A123M, ASTM A153/A153M, and ASTM A653/A653M, Z275 (G90) coating. Galvanize all components after fabrication in accordance with ASTM A385. Fabricate all steel components in the largest units practical using bolted connections for field assembly. Repair damage to, or voids in, galvanizing in accordance with ASTM A780, Annex A1 or Annex A3. Manufacturer’s verification inspection documentation for applicable ASTM listed above shall be submitted with Contractor’s quality control reports during erection or installation process.

C201003 1.2.3 - Structural Tubing

ASTM A 500

C201003 1.2.4 - Steel Pipe

ASTM A 47

C201003 1.2.5 - Gratings

c. Gray cast iron ASTM A 48, Class 40

d. Metal plank grating, non-slip requirement, FS RR-G-1602 aluminum ASTM B 209, 6061-T6; steel ASTM A 653/ A 653M, G90.

C201003 1.2.6 - Floor Plates, Patterned

ASTM A 786/A 786M, 14 gage.

C201003 1.2.7 - Anchor Bolts

ASTM A 307

C201003 1.2.8 - Expansion Anchors, Sleeve Anchors and Adhesive Anchors

Design values shall be as tested in accordance with ASTM E 488.

C201003 1.2.9 - Lag Screws and Bolts

ANSI B18.2.1

C201003 1.2.10 - Toggle Bolts

ANSI B18.2.1

C201003 1.2.11 - Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307

C201003 1.2.12 - Screws

ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3

C201003 1.2.13 - Washers

Washers shall conform to ASME B18.22.1.

C201003 1.2.14 - Safety Treads

NAAMM BG steel, Type W (welded)

C2020 STAIR FINISHES

See Section C30 “INTERIOR FINISHES” for further finish requirement.

-- End of Section --

SECTION C30

INTERIOR FINISHES
07/04

C30 GENERAL

C30 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes requirements to provide functionally appropriate, aesthetic, cost effective, sustainable, durable interior finishes and materials of colors and textures consistent with quality commercial facilities for walls, floors and ceilings.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified and registered shall be given preferential consideration over products not carrying any EPP designation.

C30 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web site. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

C30 1.2.1 - INDUSTRY STANDARDS AND CODES

Gypsum Association (GA)

International Building Code (IBC)

C30 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, Design: General Building Requirements

C30 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design”

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-120-10 (DRAFT), “Design: General Interior Design Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements"

UFC 3-800-10N, and “Design: General Environmental Requirements,”

C30 1.3.1 - No Asbestos containing materials are permitted in the manufacturer, construction or installation of the interior finishes.

C30 1.3.2 - Painting, coatings and adhesives shall comply with local and/or state environmental air pollution rules and regulations.

C30 1.3.3 - Stenciling on panel faces in occupied areas is prohibited.

C30 1.3.4 - The ceiling finishes system cannot be used in establishing the fire rating of the floor or roof structure.

C30 1.3.5 - A minimum of 2% of the total quantity of each floor finish color and pattern and ceiling tile color and pattern shall be provided, delivered, and stored within the on-base, designated storage facility for future replacement patching.

C30 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

C30 1.4.1 - Paint Applicator’s Qualifications

C30 1.4.1.1 - Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

1. Position or responsibility
2. Employer (if other than the Contractor)
3. Name of facility owner
4. Mailing address, telephone number, and telex number (if non-US) of facility owner
5. Name of individual in facility owner's organization who can be contacted as a reference
6. Location, size and description of structure
7. Dates work was carried out
8. Description of work carried out on structure]

C30 1.4.2 - Flooring

All work shall be done by installation firms specializing in commercial flooring installation specific to the project program for carpet, resilient flooring, wood flooring, and porcelain and ceramic tile. The firm shall be a member of the Floor Covering Installation Contractor's Association (FCICA) or certified by the Floor Covering Installation Board. (FCIB).

C30 1.4.3 - Porcelain Tile, Ceramic Tile, Stone and Paver Installer’s Qualifications

All work shall be done by installation firms specializing in commercial flooring installation specific to the project program for carpet, resilient flooring, wood flooring, and porcelain and ceramic tile. The firm shall be a member of the Floor Covering Installation Contractor's Association (FCICA) or certified by the Floor Covering Installation Board. (FCIB).

C30 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

C30 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-600-10N, “Design: General Fire Protection Requirements,” and DRAFT UFC 3-120-10 “Design: General Interior Design Requirements.” The design submittal requirements stated herein supersede those set forth in UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements.”

At the beginning of the facility design the Contractor’s Project Manager and the Project Interior Designer shall be required to attend an orientation meeting at Southern Division to assure a comprehensive understanding of the requirements set forth herein. Contact the Southern division Interior Design point of contact, Peggy Noland at 843-820-5736 or margaret.noland@navy.mil.

Provide an Interior Finish Schedule to include all building elements requiring finish selection. Elements include, but are not limited to, ceilings, walls, bases, floors, door and doorframes, finish hardware, and miscellaneous finishes such as toilet partitions, grout, etc. Also, provide a Finish Color Legend that identifies each finish color by the manufacturers’ names, styles, patterns, and model numbers, etc.

Provide comprehensive color boards showing samples for each finish identified in the Finish Schedule and Finish Color Legend. Include color samples for finishes in C10, “Interior Construction”. Provide samples large enough to show any special color or color combination, texture and/or pattern for any finish consisting of multiple colors, other than smooth textures, and/or patterns that would not be adequately represented in a small sample. Large samples shall supplement the color boards. Color photographs of finish colors are not acceptable. Include specification data/cut sheets for all finishes. Submittal of color boards does not relieve the Contractor of the responsibility to submit samples required elsewhere.

For each construction phase submit one set of the color boards in 216mm x 280mm (8.5” x 11”) three ring binder format at 100% to the Southern Division Interior Designer. The binders shall be reviewed and returned with comments if required for correction. The corrected color boards shall then be presented to the individual customers for discussion, review, and approval. Three copies of the customer approved colors shall be submitted in three ring binder format at the Final Design Submittal for the facility and shall be distributed one copy each for each customer, ROICC, and Southern Division Interior Designer. The Final Design Submittal shall include manufacturers’ specification data sheets, operations, and maintenance data information for each finish used.

Provide a floor finish plan clearly showing the limits of each floor material specified. Simple number and/or letter designations are not

acceptable. Include other supplemental information (i.e., plans, details, etc.) that clearly communicates special design features (i.e., floor patterns/borders, insets, or other details).

Provide written assurance that all finishes, and their respective colors, are current and shall be available at the time of construction. **Substitutions during construction of finishes and/or colors approved during design shall not be accepted/approved.**

C30 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

C30 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

Changes shall not be made to the finishes that are submitted and approved by the Government during the design phase. In the event that revisions may be required because of unforeseen conditions such as discontinued product, the revisions must be submitted to the Government for approval before substitutions can be made.

SD-02 Shop Drawings

Provide seaming diagrams for all carpeted and resilient sheet floored areas; G

Provide installation drawings for floors with tile, stone, or terrazzo to include locations and details of divider strips, control joints, crack control solutions and material transitions; G

SD-03 Product Data

Provide three copies of the design phase approved color boards in a three-ring binder format. Include manufacturers’ specification data sheets, and maintenance information for each finish used. Provide to the EFA/EFD Interior Designer and the customer; G

SD-04 Samples

Provide field samples for the following for approval prior to commencing work. Samples may be incorporated into the project work; G

Multi-colored Coating System
Acoustical Wall Panels
High Performance Architectural Coating
Impact Resistant Wall Finish

SD-07 Certificates

Porcelain Tile, Ceramic Tile, Stone, and Paver Installer's qualifications; G

Carpet and Resilient Flooring Installer's qualifications; G

Paint Applicator's qualifications; G

Asbestos Free Material Certification; G

SD-10 Operation and Maintenance Data

Provide data for each finish used; G

Wall Finishes; Data Package 1; G

Floor Finishes; Data Package 1; G

Ceiling Finishes; Data Package 1; G

C3010 WALL FINISHES

Interior wall finishes shall be moisture and mildew resistant, easily maintained, and suitable in accordance with industry standards for the architectural surface being finished.

C301001 CONCRETE WALL FINISHES

C301001 1.1 - SPECIAL OR ARCHITECTURAL FINISHES ON INTERIOR CONCRETE WALLS

Cast-in-place or pre-cast concrete wall finishes shall include, but are not limited to, abrasive blasted surfaces, colored surfaces, exposed aggregate, grooved surfaces, or tooled surfaces.

C301003 GYPSUM WALLBOARD FINISHES

Conform to specifications, standards and requirements in accordance with Gypsum Association GA 214, GA 216 and GA 224. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only. Always use 5/8" thick gypsum board when used in single layer application. Provide Type X gypsum board in fire rated assemblies.

C301003 1.1 - REGULAR GYPSUM BOARD

1219mm (48 inches) wide, 12.7mm or 15.9mm (1/2 or 5/8 inch) thick in residential construction, and 15.9mm (5/8 inch) thick in non-residential construction, tapered, ASTM C 36/C 36M and ASTM C 1396/C 1396M

C301003 1.2 - MOISTURE RESISTANT GYPSUM BOARD

1219mm (48 inches) wide, 15.9mm (5/8 inch) thick in construction, tapered. ASTM C 630/C 630M. Do not use as a substrate in tiled areas where wall tile is exposed to direct moisture contact or condensation accumulation.

C301003 1.3 - CEMENTITIOUS BACKING UNITS

1219mm (48 inches) wide, 15.9mm (5/8 inch) thick; use as a substrate for porcelain tile in wet areas that are exposed to direct moisture contact or condensation accumulation such as tubs, shower enclosures, saunas, steam rooms, gang shower rooms, and shower drying rooms, etc. (ANSI A118.9)

C301003 1.4 - IMPACT RESISTANT GYPSUM BOARD

1219mm (48 inches) wide, 15.9mm (5/8 inch) thick, tapered edges. Reinforced moisture-resistant, fire-resistant gypsum panel with imbedded fiber mesh or lexan backing tested in accordance with the following tests. Provide metal framing of 20 gauge minimum. Provide fasteners that meet manufacturer requirements and specifications. Impact resistant gypsum board, when tested in accordance with ASTM E 84, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less. Board shall be formulated for use on the interior side of exterior walls in hot, humid climates. Use board that supports the use of standard cutting tools. Finish with a high strength plaster veneer.

C301003 1.4.1 - Structural Failure Test; ASTM E 695 or ASTM D 2394

C301003 1.4.2 - Indentation Test; ASTM D 5420 or ASTM D 1037

C301003 1.4.3 - Test for Resistance to Mold Growth; ASTM D 3273

C301003 1.5 - JOINT TREATMENT

C301003 1.5.1 - Joint compound shall be specifically formulated and manufactured for use with and compatible with tape, substrate and fasteners as recommended by the manufacturer. (ASTM C 475) Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216.

C301003 1.5.2 - Provide premanufactured joints at all structural expansion joints, crack control joints, and change of materials as recommended by the manufacturer and in accordance with GA 216.

C301003 1.6 - FASTENERS

ASTM C 514. Fasteners shall be compatible with each type of gypsum board material as recommended by the gypsum board manufacturer and in accordance with GA 216 and GA 224.

C301003 1.7 - ACCESSORIES

ASTM C 1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials. Install as recommended by GA 214, GA 216 and GA 224.

C301003 1.8 - LEVEL OF FINISH

C301003 1.8.1 - Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216. Plenum areas above ceilings shall be finished to Level 1 in accordance with GA 214. Water resistant gypsum backing board, ASTM C 630/C 630M, to receive porcelain tile shall be finished to Level 2 in accordance with GA 214. Walls to receive a heavy-grade wall covering or have textured finish before painting shall be finished to Level 3 in accordance with GA 214. Walls without critical lighting to receive paint (MPI Gloss Level 2), light textures, or wall coverings shall be finished to Level 4 in accordance with GA 214. Unless otherwise specified, all gypsum board walls, partitions shall be finished to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Do not use fiberglass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer.

C301003 1.8.2 - Wherever gypsum board is to receive eggshell (MPI Gloss Level 3), semigloss (MPI Gloss Level 5) or gloss (MPI Gloss Level 6) paint finish, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to

the entire gypsum board surface, after joint and fastener treatment is complete and dry.

C301003 1.8.3 - Where lighting will accent the flatness of the wall and surface irregularities in gypsum board joints, provide feature edge gypsum board and two coat joint compound fillers. Provide this special joint treatment at up lighting, down lighting and horizontal lighting at the end of a passageway.

C301004 TILE WALL FINISHES

C301004 1.1 - PORCELAIN WALL TILE SYSTEM FINISHES

C301004 1.1.1 - Porcelain wall tile shall be a minimum of 12 inches by 12 inches and minimum 8 mm (5/16 inch) thick and installed from floor to ceiling, unless otherwise noted. Tile shall have a minimum breaking strength of 300 pounds per ASTM C 648, scratch hardness of 8.0 MOHS, and a maximum absorption rate of 0.5% per ASTM C 373.

C301004 1.1.2 - Tile shall be polished or matte or glazed or unglazed finish. At a minimum, manufacturer’s full offering of low through medium priced styles and full color line shall be offered.

C301004 1.1.3 - Tile size variation, accent colors, and tile patterns shall be assumed and applied as a design feature, including all color groups available from manufacturer’s offering.

C301004 1.1.4 - Colored grout to blend with tile shall be provided. Grout shall be factory sanded, epoxy, ANSI A118.3 and have a maximum 1/8” grout width.

C301004 1.1.5 - Coordinate with porcelain tile bath accessories for modularity. Include all trim pieces, caps, stops, and returns to complete installation.

C301005 PAINTING TO WALLS

C301005 1.1 - GENERAL REQUIREMENTS

All paint shall be suitable in accordance with the Master Painter Institute (MPI) standards for the interior architectural surface being finished. The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a more current MPI "Approved Product List", however, only one list may be used for the entire contract. All coats on a particular substrate, or a paint system, must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable. If the RFP does not identify a paint system applicable to all painting of the facility, utilize the MPI “Architectural Painting, Interior System” manual to identify appropriate paint coatings. Utilize the “Premium Grade” systems and comply with all limitations stated in the MPI “Approved Products List” for each system. Products having an MPI EPR 3 rating shall be given preferential consideration over MPI EPR ratings of 2 and 1 respectively. The higher performing systems shall be used unless the lower performing systems can be justified based on life cycle costs to include surface preparation, application, disposal, environmental impact, and recoating cycles based on exposure requirements

C301005 1.1.1 - MPI Gloss Levels

MPI system of defining gloss: Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6. Gloss is tested in accordance with

ASTM D 523. Use G2 Flat for ceilings, residential walls and low traffic areas. Use G3 Eggshell in high traffic areas for ceilings and walls, when a surface can be touched and a slightly more durable finish is desired and for dark accent colors. Use G5 Semigloss for ceilings, walls, doors and trim for high durability and cleanability. Use G6 Gloss only in special situations such as for piping identification or special effects.

C301005 1.1.2 - MPI System Number

The MPI coating system number in each Division is found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an interior system (INT/RIN). The Division number follows the CSI Master Format.

C301005 1.1.3 - MPI Designations

C301005 1.1.3.1 - INT is the MPI short-term designation for an interior coating system.

C301005 1.1.3.2 - DSD is the MPI short-term designation for Degree of Surface Degradation as defined in the Assessment sections in the MPI Maintenance Repainting Manual.

C301005 1.1.3.3 - RIN is the MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

C301005 1.1.4 - Surface Preparation

Comply with the MPI “Architectural Painting, Interior Surface Preparation” Manual, except all suggestive language shall be deleted and directive language substituted in its place. All suggestive language such as “may”, “must”, and “should” are deleted from the standard and “shall” inserted in its place. Suggestive language such as “recommended” or “advisable” are deleted from the standard and “require” or “required” inserted in its place. The results of these wording substitutions change this document to required procedures.

C301005 1.2 - PAINTED FINISHES TO GYPSUM BOARD WALL SURFACES

C301005 1.2.1 - New, previously painted gypsum wallboard not otherwise specified:

C301005 1.2.1.1 - High Performance Architectural Latex, System DFT: 4 mils

a. New; MPI INT 9.2B-G2 (Flat)/Existing; MPI RIN 9.2B-G2 (Flat); Primer: MPI 50, Intermediate: MPI 138, Topcoat: MPI 138

b. New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell); Primer: MPI 50, Intermediate: MPI 139, Topcoat: MPI 139

c. New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss); Primer: MPI 50, Intermediate: MPI 141, Topcoat: MPI 141

C301005 1.2.1.2 - Institutional Low Odor / Low VOC Latex, System DFT: 4 mils

a. New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell); Primer: MPI 50, Intermediate: MPI 145, Topcoat: MPI 145

b. New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin); Primer: MPI 50, Intermediate: MPI 146, Topcoat: MPI 146

c. New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss); Primer: MPI 50, Intermediate: MPI 147, Topcoat: MPI 147

C301005 1.2.2 - New, previously painted gypsum wallboard in toilets, restrooms, shower areas, areas requiring a high degree of sanitation, and other high humidity areas not otherwise specified:

C301005 1.2.2.1 - Waterborne Light Industrial Coating, Use for high traffic areas. System DFT: 4 mils

New; MPI INT 9.2L-G5(Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss) Primer: MPI 50, Intermediate: MPI 110-G5, Topcoat: MPI 110-G5

C301005 1.2.3 - New, previously painted gypsum wallboard in Janitor's Closet.

C301005 1.2.3.1 - Water-based Epoxy, MPI No. 115. Apply at not less than manufacturer's recommended spreading rate.

C301005 1.3 - PAINTED FINISHES TO BLOCK WALL SURFACES

C301005 1.3.1 - New concrete masonry, (Fill all holes in masonry surface):

C301005 1.3.1.1 - High Performance Architectural Latex, System DFT: 11 mils

a. New; MPI INT 4.2D-G2 (Flat) Filler: MPI 4, Primer: N/A, Intermediate: MPI 138, Topcoat: MPI 138

b. New; MPI INT 4.2D-G3 (Eggshell) Filler: MPI 4, Primer: N/A, Intermediate: MPI 139, Topcoat: MPI 139

c. New; MPI INT 4.2D-G5 (Semigloss) Filler: MPI 4, Primer: N/A, Intermediate: MPI 141, Topcoat: MPI 141

C301005 1.3.1.2 - Institutional Low Odor / Low VOC Latex, System DFT: 4 mils

a. New; MPI INT 4.2E-G3 (Eggshell) Filler: MPI 4, Primer: N/A, Intermediate: MPI 145, Topcoat: MPI 145

b. New; MPI INT 4.2E-G5 (Semigloss) Filler: MPI 4, Primer: N/A, Intermediate: MPI 147, Topcoat: MPI 147

C301005 1.3.2 - New concrete masonry units in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, and other high humidity areas unless otherwise specified, (Fill all holes in masonry surface):

C301005 1.3.2.1 - Waterborne Light Industrial Coating, System DFT: 11 mils

a. MPI INT 4.2K-G3(Eggshell) Filler: MPI 4, Primer: N/A, Intermediate: MPI 110-G3, Topcoat: MPI 110-G3

b. MPI INT 4.2K-G5(Semigloss) Filler: MPI 4, Primer: N/A, Intermediate: MPI 110-G5, Topcoat: MPI 110-G5

C301005 1.4 - PAINTED FINISHES TO INTERIOR GRILLES, REGISTERS, DIFFUSERS, ACCESS PANELS AND PANEL BOXES

Interior grilles, registers, diffusers, access panels and panel boxes shall be painted with a primer and two coats of high performance latex or alkyd semi gloss or have a factory finish in a color to match the adjacent surfaces.

C301005 1.5 - PAINTED FINISHES TO STEEL STRUCTURAL MEMBERS

Refer to Section B201010 for painting of steel structure.

C3020 FLOOR FINISHES

C302001 TILE FLOOR FINISHES

Provide tile floor finishes as described below in accordance with ANSI 137.1. Install tile flooring in accordance with the TCA "Handbook for Ceramic Tile Installation." Refer to the RFP Project Program and materials approved in the design phase for color, size, pattern and style of tile.

Provide colored epoxy grout ANSI 118.3.

Tile size variation, accent colors, and tile patterns shall be assumed and applied as a design feature, including all color groups available.

C302001 1.1 - PORCELAIN FLOOR TILES

Porcelain floor tiles shall be 2" x 2" in showers and slope floors to drains. In other areas, tiles shall be a minimum of 12" x 12" x 8 mm (5/16 inch) thick with cushioned edge. Drains in these areas shall be square and flush with the 12" x 12" tiles. Tile shall have a minimum breaking strength of 350 pounds (ASTM C648) and have a maximum absorption rate of 0.5% (ASTM C 373).

C302001 1.1.1 - Grout shall be factory sanded, chemical resistant epoxy resin, ANSI A118.3 and have a maximum 18" grout joint width.
C302001 1.2.2 - Slip resistant tile shall have a minimum Coefficient of Friction of 0.6 (wet) 0.7 (dry) when tested in accordance with ASTM C1028. Non-slip or textured surface required for tile in areas where there is excessive water or grease and oils such as kitchens, dining facilities, toilets, and in industrial and maintenance facilities.

C302001 1.1.3 - Porcelain floor tile shall be polished or matte or glazed or unglazed finish.

C302001 1.2 - TILE BASE FINISHES

Coordinate tile base with porcelain wall and floor tile for modularity. Include all pre-manufactured trim pieces, special shapes, caps, stops, and returns to provide a complete installation. Provide coordinating wall, base and floor tile for curb construction.

C302004 RESILIENT FLOOR FINISHES

All resilient flooring shall meet or exceed applicable ADA horizontal requirements. Each type of flooring shall be installed with recommended adhesive in accordance with the manufacturers' written instructions. Installers shall be approved by the manufacturer in writing and shall have a minimum of 3 yrs experience for each type of flooring to be installed. A minimum of 2% total quantity for each type flooring, color and pattern shall be provided and stored within each building for future replacement patching.

C302004 1.1 - RESILIENT TILE FLOORING SYSTEM

C302004 1.1.1 - Quartz Reinforced Vinyl Tile (QVT) shall be a high performance, heavy duty, commercial grade tile with a minimum 70% quartz crystal. Quartz Reinforced Vinyl Tile shall be impact resistant in accordance with ASTM F 970 and shall guarantee a 15-year wear warranty. Flame spread rating of less than 75 when tested in accordance with ASTM E-

84 and greater than 1.0 when tested in accordance with ASTM E-684 is required. Size: 24″ x 24″, 18″ x 18″, or 12″ x 12″. Thickness: 0.100″ gauge. Quartz Reinforced Vinyl Tile shall be dimensionally stable with homogenous color throughout. Calcium Chloride, Bond, and Alkali Tests are required for installations over concrete. Calcium Chloride Tests shall be conducted in accordance with the latest edition of ASTM F 1869, "Standard Test Method for Measuring vapor Emission Rate of Concrete Sub Floor Using Anhydrous Calcium Chloride". A minimum of three calcium chloride tests shall be used for the first 1,000 sq. ft. and one additional test for reach additional 1,000 sq. ft. Each of the three (calcium chloride, bond, alkali) tests shall be conducted in accordance with the test manufacturer's comprehensive written instructions. Any/all hydrostatic pressure, bonding, and/or alkali issues shall be addressed and resolved prior to the installation of the quartz reinforced vinyl tile. The Quartz Reinforced Vinyl Tile flooring shall be installed with the tile manufacturer's recommended adhesive and accessories and in accordance with the manufacturer's comprehensive written instructions. Acceptable products include Rikett Quartz Tile, Altro Quartz Tile or equal. Manufacturer's full color line shall be offered.

C302004 1.1.2 - Resilient tile floor finish shall be tile of 100% synthetic rubber with color through, slip retardant formulation and a round or square profile with a minimum base thickness of 3.2mm (0.125 inch) and a minimum stud height of 0.6mm (0.024 inch). Rubber tile shall conform to ASTM F 1344, Class I and ASTM E 648, Class 1. The product shall require no wax maintenance. A manufacturer's 10-year warranty is required.

C302005 CARPETING

C302005 1.1 - GENERAL

Installer(s) shall be approved by the manufacturer in writing. Carpet manufacturer shall be established and in good standing with industry. A minimum of 5% total quantity for each color and pattern shall be provided and stored within the building for future replacement patching.

C302005 1.2 - CARPET CONSTRUCTION

C302005 1.2.1 - Loop Pile Carpet Tiles (CPTT-1)

Provide 24″ x 24″ modular, commercial quality, multi-colored, multi-level, textured, patterned loop carpet floor tile with factory-attached cushion. Carpet fiber shall be branded, 100% 6 or 6,6 nylon of Dupont Antron Lumina nylon, Mohawk Colorstrand SD nylon, Shaw Tile Eco Solution Q nylon, J & J Encore, or Solutia VIP and contain at least 40% recycled nylon. Dye method shall be 100% solution dyed. Carpet tile shall have a non-woven synthetic primary backing and a secondary backing of fiberglass reinforced thermoplastic composition. Minimum Pile weight shall be 28 oz/sq. yd. Minimum yarn density shall be 6,500. Carpet must be treated with an anti-microbial agent. The attached cushion shall be suitable for severe traffic installations and shall not exceed 9 mm (3/8 inch) in thickness. Mohawk EcoFlex Modular System cushion, or equal, is acceptable.

Carpet shall be Class I, meeting the minimum radiant flux requirements if NFPA 101 when tested in accordance with ASTM E 648. Carpet shall include a permanent static control system to control static build-up to less than 3.5 KV in accordance with AATCC-134. A lifetime warranty for colorfastness to light, static, staining, and wear is required. A 10-year warranty for colorfastness to atmospheric contaminants is required. CRI appearance retention rating shall be for severe traffic. Carpet shall meet all CRI requirements for the IAQ Green Label Plus.

Provide quick release glue down application. Adhesive(s) shall be recommended by the carpet manufacturer and in accordance with the warranty. Installer(s) shall be approved by the manufacturer, in writing. Carpet manufacturer shall be established and in good standing with industry. The manufacturer’s technical representative shall review and approve each typical sample application or each room installation on-site prior to resuming the installation and render on-site approval of the completed installation.

A minimum of 2% total quantity for each color and pattern shall be provided, delivered, and stored within the on-base, designated storage facility for future replacement patching.

C302005 1.2.2 - Cut and Loop Pile Carpet Tiles (CPTT-2)

Provide 24” x 24” modular, commercial quality, multi-colored, textured, (upgraded appearance) patterned cut/loop carpet floor tile with factory-attached cushion. Carpet fiber must be branded, 100% 6 or 6,6 nylon of Dupont Antron Lumina nylon, Mohawk Colorstrand SD nylon, Shaw Tile Eco Solution Q nylon, J & J Encore, or Solutia VIP and contain at least 40% recycled nylon. Dye method shall be 100% solution dyed or a combination of 80% solution dyed and 20% yarn dyed. Carpet tile shall have a non-woven synthetic primary backing and a secondary backing of fiberglass reinforced thermoplastic composition. Minimum Pile weight shall be 30 oz/sq/yd. Minimum yarn density shall be 6,500. Carpet must be treated with an anti-microbial agent. The attached cushion shall be suitable for severe traffic installations and shall not exceed 9 mm (3/8 inch) in thickness. Mohawk EcoFlex Modular System cushion, or equal, is acceptable.

Carpet shall be Class I, meeting the minimum radiant flux requirements if NFPA 101 when tested in accordance with ASTM E 648. Carpet shall include a permanent static control system to control static build-up to less than 3.5 KV in accordance with AATCC-134. A lifetime warranty for colorfastness to light, static, staining, and wear is required. A 10-year warranty for colorfastness to atmospheric contaminants is required. CRI appearance retention rating shall be for severe traffic. Carpet shall meet all CRI requirements for the IAQ Green Label Plus.

Provide quick release glue down application. Adhesive(s) shall be recommended by the carpet manufacturer and in accordance with the warranty. Installer(s) shall be approved by the manufacturer, in writing. Carpet manufacturer shall be established and in good standing with industry. The manufacturer’s technical representative shall review and approve each typical sample application or each room installation on-site prior to resuming the installation and render on-site approval of the completed installation.

A minimum of 2% total quantity for each color and pattern shall be provided, delivered, and stored within the on-base, designated storage facility for future replacement patching.

C302007 PAINTING AND STAINING FLOORS

C302007 1.1 - PAINTED FLOOR FINISHES

Refer to Section C30, “Painting to Walls” paragraphs stating “GENERAL REQUIREMENTS” for additional requirements.

Provide urethaned floor finishes applied to concrete floors.

C302007 1.1.1 - New concrete floors:

C302007 1.1.1.1 - Epoxy, New; MPI INT 3.2C-G6 (Gloss) / Existing; MPI RIN 3.2C-G6 (Gloss), System DFT: 5 mils
Primer: MPI 77, Intermediate: MPI 77, Topcoat: MPI 77

C302008 WALL BASE FINISHES

Provide a wall base for transition between floor and wall finish. Provide rubber cove base at exposed, sealed concrete and wedge-shaped toeless base at resilient tile floors. Provide a base to match the floor material at hard surface tile floors, or as required in the project program.

C302008 1.1 - RESILIENT WALL BASE FINISHES

C302008 1.1.1 - All resilient base shall be rubber and shall be 100 mm(4 inch) height and 3.2mm (1/8 inch) thickness as required unless indicated otherwise. The wall base shall include inside and outside corners and shall conform to ASTM F-1861-98, Type TS.

C302099 OTHER FLOORING AND FLOOR FINISHES

C302099 1.1 - HARDENERS AND SEALERS FOR CONCRETE FLOOR FINISH

Cure concrete floors in accordance with the finished floor manufacture requirements. Utilize other methods of concrete curing if the floor finish manufacturer does not recommend a chemical hardener or sealer. Concrete floors that can utilize a hardener sealer and will be exposed to traffic shall receive a minimum of two coats of hardener sealer curing agent for dust protection. These hardener sealer cured floors shall be finished with a curing agent that shall penetrate the concrete to permanently seal the floor against moisture and the penetration of contaminants. The curing agent shall be non-toxic, non-flammable, and non-combustible and shall be installed in accordance with the manufacturer’s printed instructions. The finished floor shall be dust-free. Concrete floor shall be trowel applied in a pattern, or shall include grit for slip resistance.

C3030 CEILING FINISHES

C303001 EXPOSED CONCRETE FINISHES

Refer to Section C30, “Painting to Walls” paragraphs stating “GENERAL REQUIREMENTS” for additional requirements.

Exposed concrete ceiling finish shall be interior High Performance Architectural Latex, System DFT: 11 mils

C303001 1.1 - New; MPI INT 3.1C-G2 (Flat)
Primer: N/A, Intermediate: MPI 138, Topcoat: MPI 138

C303001 1.2 - New; MPI INT 3.1C-G3 (Eggshell)
Primer: N/A, Intermediate: MPI 139, Topcoat: MPI 139

C303003 GYPSUM WALLBOARD CEILING FINISHES

Conform to specifications, standards and requirements in accordance with Gypsum Association GA 214, GA 216 and GA 224. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only. Provide featured edge gypsum board on all gypsum surfaces that flatness of joints will be visible, such as uplighted ceilings, window lighted ceilings, and as recommended by the manufacturer. Always use 5’8” thick gypsum board when used in single layer application. Provide Type X gypsum board in fire rated assemblies. Provide a foil back gypsum board when a vapor retarder is required.

C303003 1.1 - REGULAR GYPSUM BOARD

1219mm (48 inches) wide, 15.9 mm (5/8 inch) thick, tapered edge, (ASTM C 36/C 36M and ASTM C 1396/C 1396M).

C303003 1.2 - MOISTURE RESISTANT GYPSUM BOARD

1219mm (48 inches) wide, 15.9mm (5/8 inch) thick, tapered edges. (ASTM C 630/c 630M) Use for ceilings in humid areas. Do not use as a substrate in tiled areas where tile will be exposed to direct moisture contact or condensation accumulation. Support moisture resistant gypsum board at 305mm (12 inches) on center.

C303003 1.3 - CEMENTITIOUS BACKING UNITS

1219mm (48 inches) wide, 15.9mm (5/8 inch) thick; use for adhesive applied porcelain tile in wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms, or for shower areas with a veneer plaster finish. Support cementitious backing units at 305mm (12 inches) on center. (ANSI A118.9)

C303003 1.4 - JOINT TREATMENT

C303003 1.4.1 - Joint compound shall be specifically formulated and manufactured for use with and compatible with tape, substrate and fasteners as recommended by the manufacturer. (ASTM C 475) Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216.

C303003 1.4.2 - Provide premanufactured joints at all structural expansion joints, crack control joints, and change of materials as recommended by the manufacturer and in accordance with GA 216.

C303003 1.5 - FASTENERS

ASTM C 514. Fasteners shall be compatible with each type of gypsum board material as recommended by the gypsum board manufacturer and in accordance with GA 216 and GA 224.

C303003 1.6 - ACCESSORIES

ASTM C 1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials. Install as recommended by GA 214, GA 216 and GA 224.

C303003 1.7 - LEVEL OF FINISH

C303003 1.7.1 - Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216. Ceilings to receive a heavy-grade wall covering or heavy textured finish before painting shall be finished to Level 3 in accordance with GA 214. Ceilings without critical lighting to receive flat paints, light textures, or wall coverings shall be finished to Level 4 in accordance with GA 214. Unless otherwise specified, all gypsum board walls, partitions and ceilings shall be finished to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Do not use fiberglass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer.

C303003 1.7.2 - Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions

occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

C303004 ACOUSTICAL CEILING TILES AND PANELS

C303004 1.1 - ACOUSTICAL CEILING PANELS

All acoustical ceiling panels shall be Class A, flame spread 25 or less and smoke development of 50 or less when tested in accordance with ASTM E 84. All acoustical ceiling panels shall have recycled content. Acoustical ceiling panels shall conform to ASTM E1264.

C303004 1.1.1 - For typical open office areas, conference rooms, executive offices, provide non-asbestos mineral composition acoustical ceiling panels of Type III with factory-applied standard washable painted finish or Type IV with factory-applied plastic membrane-faced vinyl, Form: 1, 2, or 3; Size: 610mm by 610mm by 19mm (24 inch by 24 inch by 3/4 inch), Light reflectance: minimum of .75, and recycled content: minimum of 60%. Provide reveal (tegular) edge.

C303004 1.1.2 - Provide NRC and CAC ratings as follows:

Type of space	Minimum NRC	Minimum CAC
Open Office Areas	.75	40-44
Conference Rooms, Classrooms	.60	35-39
Activity spaces, Lobbies, Corridors	.60	35-39
Toilets	.50	35-39
Fitness/Locker Rooms	.50	35-39
All other spaces	.50	35-39

Base the tested NRC value on Mounting Type E-400 of ASTM E 795.

C303006 PAINTING AND STAINING CEILINGS

C303006 1.1 - PAINTED CEILINGS

Refer to Section C30, “Painting to Walls” paragraphs stating “GENERAL REQUIREMENTS” for additional requirements.

C303006 1.1.1 - New gypsum wallboard not otherwise specified:

C303006 1.1.1.1 - High Performance Architectural Latex, System DFT: 4 mils

a. New; MPI INT 9.2B-G2 (Flat)/Existing; MPI RIN 9.2B-G2 (Flat); Primer: MPI 50, Intermediate: MPI 138, Topcoat: MPI 138

b. New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell); Primer: MPI 50, Intermediate: MPI 139, Topcoat: MPI 139

c. New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss); Primer: MPI 50, Intermediate: MPI 141, Topcoat: MPI 141

C303006 1.1.1.2 - Institutional Low Odor / Low VOC Latex, System DFT: 4 mils

a. New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell); Primer: MPI 50, Intermediate: MPI 145, Topcoat: MPI 145

b. New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin); Primer: MPI 50, Intermediate: MPI 146, Topcoat: MPI 146

c. New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss); Primer: MPI 50, Intermediate: MPI 147, Topcoat: MPI 147

C303006 1.1.2 - New gypsum wallboard in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, and other high humidity areas not otherwise specified:

C303006 1.1.2.1 - Waterborne Light Industrial Coating, Use for high traffic areas. System DFT: 4 mils

New; MPI INT 9.2L-G5(Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss) Primer: MPI 50, Intermediate: MPI 110-G5, Topcoat: MPI 110-G5

C303006 1.1.2.2 - Epoxy, Use for high humidity areas requiring easy to clean enamel finishes. System DFT: 4 mils

New; MPI INT 9.2E-G6 (Gloss) / Existing; MPI RIN 9.2D-G6 (Gloss) Primer: MPI 50, Intermediate: MPI 77, Topcoat: MPI 77

C303007 SUSPENSION SYSTEMS

C303007 1.1 - EXPOSED SUSPENDED ACOUSTICAL CEILING GRID

Provide 610mm by 610mm (24 inch by 24 inch aluminum or steel non-corroding intermediate-duty standard grid system for lay-in acoustical panels (ASTM C 635). Finish shall be factory applied white baked enamel. Provide manufacturer’s hold down clips for fire rated assemblies and wall or edge molding. Hang grid system as recommended by manufacturer but with no less than 2.7mm (0.106 inch) diameter wires (ASTM A641A, A641M, Class 1), or with one by 4.76mm (3/16 inch) galvanized steel straps conforming to ASTM A653A, A653M (for light commercial zinc coating) or ASTM A366A, A366M (with an electrodeposited zinc coating, Type RS). Use ASTM A 580/A 580M, composition 302 or 304, condition annealed stainless steel, 2.7mm (0.106 inches) in diameter over high humidity areas such as commercial kitchens and pools. Install suspended grid system with acoustical sealant (ASTM C843, nonstaining) and in accordance with ASTM C636. Recycled content shall be a minimum of 25%.

C303007 1.2 - SUSPENDED AND FURRED CEILING SYSTEMS

ASTM C 841 (for lath); ASTM C 645 (for GWB).
Provide steel materials for metal support systems with galvanized coating per ASTM A 653/ A 653M, G60; aluminum coating ASTM A 463/ A 463M, T1-25; or a 55% aluminum-zinc coating. Provide suspended ceiling framing in accordance with ASTM C 754, except framing members shall be 400m (16 inches) unless otherwise noted.

- End of Section –

SECTION D10

CONVEYING
07/04

D10 GENERAL

D10 1.1 - NARRATIVE

This section shall be used in conjunction with all parts of the Design/Build (D/B) Request for Proposal to determine the full requirements of this solicitation.

This section includes the requirements for monorails with electric powered hoists.

D10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web site. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

D10 1.2.1 - Industry Standards and Codes

Refer to UMRL for reference designation identification

International Building Code (IBC)

International Mechanical Code (IMC)

International Plumbing Code (IPC)

Other applicable standards as listed in UFGS 14240 and UFGS 14637

D10 1.2.2 - Government Standards

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

P-307, “Management of Weight Handling Equipment”

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-420-01, “Design: Plumbing Systems”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 14637, “Cranes, Overhead Electric Under running under 20,000 Pounds”

D10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the design standards as listed above as a minimum.

D10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

D10 1.4.1 - Data Requirements: Comply with UFGS 14637, “Cranes, Overhead Electric, Underrunning (Under 20,000 Pounds)” as applicable, and the requirements of other paragraphs in this specifications.

D10 1.4.2 - Drawing Requirements: Comply with and UFGS 14637, “Cranes, Overhead Electric, Underrunning (Under 20,000 Pounds)” as applicable, and the requirements of other paragraphs in this specifications.

D10 1.4.3 - Design Data: Comply with and UFGS 14637, “Cranes, Overhead Electric, Underrunning (Under 20,000 Pounds)” as applicable, and the requirements of other paragraphs in this specifications.

D10 1.5 - COMPLIANCE VERIFICATION

D10 1.5.1 - Compliance with the requirements will be determined by a review of the design and construction submittals and by field testing and inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory conveying system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

D10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures”, UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

D10 1.6.1 - DESIGN SUBMITTAL SPECIFICATION

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4)

edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

D10 1.7 - CONSTRUCTION SUBMITTALS

Submit in accordance with UFGS Specification Section and UFGS 14637, “Cranes, Overhead Electric, Underrunning (Under 20,000 Pounds)” and the following:

SD-02 Shop Drawings

Submit drawings showing the general arrangement of the track beam system, including curves and switches, clearances, principal dimensions, details of structural connections, and all component details. Manufacturer's catalog data will suffice for items of standard manufacturer.

SD-10 Operation and Maintenance Data

After approval, by the Contracting Officer, assimilate construction submittals into the OMSI manuals required under Section 01781, "Operation and Maintenance Data".

D1090 OTHER CONVEYING SYSTEMS

D109003 OVERHEAD CRANES

Comply with NAVFAC publication P-307, “Management of Weight Handling Equipment.”

D109003 1.1 - CRANES, OVERHEAD ELECTRIC

The Designer of Record shall utilize UFGS Specification Section 14637, “Cranes, Overhead Electric, Underrunning (Under 20,000 Pounds)” for cranes under 10 tons, and shall submit the edited specification section as a part of the design submittal for the project. See paragraph **D10** for additional specification requirements.

-- End of Section --

SECTION D20

PLUMBING
07/05

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D20 GENERAL

D20 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the design and construction of interior plumbing systems for the Riverine and Combatant Craft Operations Facility. This section covers installations inside the facility and out to the five foot line. See Section G30 “Site Mechanical Utilities” for continuation of systems beyond the five foot line.

D20 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (URML) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

D20 1.2.1 - Industry Standards and Codes

INTERNATIONAL FUEL GAS CODE (IFC)

INTERNATIONAL MECHANICAL CODE (IMC)

INTERNATIONAL PLUMBING CODE (IPC)

D20 1.2.2 - Government Standards

Federal Energy Management Program (FEMP)

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 3-420-01, “Design: Plumbing Systems”

UFC 3-430-07, “Operations and Maintenance: Inspection And Certification Of Boilers and Unfired Pressure Vessels”

UFC 4-010-01, “DoD Minimum Antiterrorism Standard for Buildings”

D20 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01 "Design: General Building Requirements"

UFC 1-300-03N "Design Procedures"

UFC 3-400-10N, "Design: General Mechanical Requirements"

UFC 3-420-01, “Design: Plumbing Systems”

UFC 3-800-10N "Design: General Environmental Requirements"

UFC 4-010-01, "DoD Minimum Antiterrorism Standard for Buildings"

D20 1.3.1 - Plumbing System

Provide an interior plumbing system as described in the Project Program including accessories and devices as necessary and required for a complete and usable system.

D20 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with the industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

The advisory provisions of all codes and standards shall be mandatory, as though the word “shall” had been substituted for “should” wherever it appears. Reference to the “authority having jurisdiction” shall be interpreted to mean “Contracting Officer”. All equipment shall be installed and used in accordance with instructions included in the listing or labeling and in accordance with manufacturer’s recommendations.

D20 1.4.1 - Material Standards

Materials, equipment, fixtures, and other appurtenances shall comply with applicable Underwriters Laboratories, (UL) Inc., American National Standards Institute, Inc., and National Electrical Manufacturer’s Association standards or applicable standards of a similar independent testing organization. All materials shall be new, and shall bear the label of Underwriters Laboratories whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer’s recommendations.

D20 1.4.1.1 - Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place, the nameplate of the distributing agent will not be acceptable.

D20 1.4.2 - Anti-terrorism

Design shall include the anti-terrorism requirements indicated in UFC 4-010-01.

D20 1.4.3 - Training

After installation of the equipment and systems, provide individual training courses for two Government personnel for each of the items listed below, covering items contained in the Operations and Maintenance manuals. Provide one copy of the Operations and Maintenance manuals for each two course attendees. Provide one DVD disc of the training courses to be used as refresher courses and to train additional personnel. Training shall be conducted by the same factory trained engineer that supervised the installation of the system. Training shall include classroom discussion as well as hands on maintenance, replacement of typical components and repair type maintenance training for parts typically replaced or repaired in the field. Submit training plan 30 calendar days prior to training sessions. Training plan shall include scheduling, content, outline, and training material handouts. Provide training for:

Domestic hot water systems

Compressed air system

D20 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of compliance with ASHRAE 90.1 requirements will be determined by a review of the submitted Compliance Documentation Forms from the ASHRAE 90.1 User's Manual.

D20 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures”, UFC 1-300-03N "Design Procedures", UFC 3-420-01, “Design: Plumbing Systems”, and UFC 3-400-10N, “Design: General Mechanical Requirements”.

D20 1.6.1 - DESIGN SUBMITTAL SPECIFICATION

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all

UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

D20 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N “Construction Submittal Procedures”:

SD-03 Product Data

Water closets; G

Urinals; G

Lavatories; G

Sinks; G

Showers/Tubs; G

Faucets, shower heads, mixing valves, thermostatic control; G

Drinking Fountains and Coolers; G

Emergency Fixtures; G

All trim packages; G

Backflow Preventers; G

Water heaters; G

Floor drains; G

Oil/Water Separator; G

Air compressors; G

Air receiver; G

Station outlets and terminal units; G

Refrigerated air dryers; G

Quick disconnect couplings; G

Filter/moisture separators; G

Regulators; G

SD-06 Test Reports

Leak test; G

SD-07 Certificates

Pressure vessel tests with ASME certification and stamp.

Backflow preventers

SD-10 Operation and Maintenance Data

Submit data packages in accordance with Section 01781, “Operation and Maintenance Data”.

Water heater, Data Package 2; G

Electric water coolers, Data Package 2; G

Air compressor, Data Package 2; G

Refrigerated air dryer, Data Package 2; G

SD-11 Closeout Submittals

Posted operating instructions; G

D2010 PLUMBING FIXTURES

Plumbing fixtures shall be provided in accordance with the IBC, IPC, and as specified.

D201001 WATER CLOSETS

D201001 1.1 - FLUSH VALVE TYPE WATER CLOSETS

ASME A112.19.2M, white vitreous china, wall-mounted, siphon jet, 1.6 gallons per flush, elongated bowl with white solid plastic elongated open-front seat. Provide ASME A112.19.5 trim. Provide self-closing metering type flush valve.

D201001 1.2 - HANDICAPPED FLUSH VALVE TYPE WATER CLOSETS

Same as paragraph 1.1 or 1.2, except mounting height to top of seat shall be 17 to 19 inches above finished floor and flush valve shall be mounted 11-1/2 inches above fixture rim to clear grab bars.

D201002 URINALS

D201002 1.1 - FLUSH VALVE TYPE URINALS

ASME A112.19.2M, white vitreous china, wall-mounted, wall outlet, siphon jet, integral trap, extended side shields. Water flushing volume of the flush valve and urinal combination shall not exceed 1 gallon per flush. Provide large diaphragm (not less than 2.625 inches upper chamber inside diameter at the point where the diaphragm is sealed between the upper and lower chambers), nonhold-open self-closing metering flush valve of chrome plated cast brass conforming to ASTM B 584, including vacuum breaker and angle (control-stop) valve. Provide ASME A112.19.5 trim and ASME 112.6.1M concealed chair carriers.

D201002 1.2 - HANDICAPPED FLUSH VALVE TYPE URINALS

ASME A112.19.2M, white vitreous china, wall-mounted, wall outlet, blowout action, integral trap, elongated projecting bowl, 20 inches long from wall

to front of flare, and ASME A112.19.5 trim. Provide large diaphragm (not less than 2.625 inches upper chamber inside diameter at the point where the diaphragm is sealed between the upper and lower chambers), nonhold-open flush valve of chrome plated cast brass conforming to ASTM B 584, including vacuum breaker and angle (control-stop) valve. The water flushing volume of the flush valve and urinal combination shall not exceed 1 gallon per flush. Furnish urinal manufacturer's certification of conformance. Provide ASME A112.6.1M concealed chair carriers. Mount urinal with front rim a maximum of 17 inches above floor and flush valve handle a maximum of 44 inches above floor.

D201003 LAVATORIES

D201003 1.1 - COUNTERTOP LAVATORIES

Provide white, ASME A112.19.2M vitreous china lavatories with minimum dimensions of 20 inches wide x 18 inches front to rear, and self-rimming type. Provide ASME 112.18.1M copper alloy self-closing metering centerset faucets with aerator and perforated grid strainers.

D201003 1.2 - WALL-MOUNTED LAVATORIES

ASME A112.19.2M white vitreous china with ASME A112.6.1M concealed arm carrier support, straight back type, minimum dimensions of 20 inches wide by 18 inches front to rear. Provide ASME A112.18.1M copper alloy self-closing metering, centerset faucets with aerator, perforated grid strainers, and 1.25 inch adjustable P-traps. Flow shall not exceed 2.5 gpm at 80 psi flow pressure. Faucet that limit the period of water discharge shall not exceed 0.25 gallon per discharge cycle at 80 psi flow pressure. Provide ASME A112.6.1M concealed chair carriers.

D201003 1.3 - HANDICAPPED LAVATORIES

Same as Paragraphs 1.1 or 1.2 with the following exceptions: copper alloy centerset faucets, gooseneck spout with aerator 5 inches above rim, 4 inch wrist action handles, and perforated grid strainers. Faucets shall open within one-quarter turn in opposite directions. Provide offset tailpiece and padding on drain components.

D201004 SINKS

D201004 1.1 - MOP SINKS

Pre-cast terrazzo floor-mounted mop sink, 36 inches x 36 inches x 12 inches shall be made of marble chips cast in white Portland cement to a compressive strength of not less than 3625 PSI 7 days after casting. Provide brass body drains with nickel bronze strainers cast integral with terrazzo. Provide stainless steel rim guard for mop sink. Provide chrome-plated exposed hot and cold water faucets ASME A112.15.M wall-mounted copper alloy faucets swing spout with 3/4 inch hose connection, vacuum breaker, and pail hook. Provide mop hanger on wall above sink suitable for four mops.

D201004 1.2 - COUNTERTOP SINKS

ANSI/ASME A112.19.3M sink, 20 gage stainless steel with integral mounting rim, minimum dimensions of 840 mm (33 inches) wide for two compartment or 560 mm (21 inches) wide for one compartment by 560 mm (21 inches) front to rear, with

ledge back and undersides coated with sound dampening material. Provide top-mounted ASME A112.18.1M copper alloy faucets, swing spout with aerator, and stainless steel drain outlets with cup strainers. Provide adjustable P-trap with drain piping to vertical vent stack.

D201005 SHOWERS/TUBS

D201005 1.1 - SHOWER SUPPLY FITTINGS

Provide ASME A112.18.1M, self-cleaning shower heads with a maximum flow rate of 2.5 GPM, connected to concealed pipe connected to copper alloy pressure balance single control type mixing valves with front access integral screwdriver stops. Anchor the mixing valves and the pipe to each showerhead in wall to prevent movement.

D201005 1.2 - HANDHELD SHOWER HEAD

ASSE 1014, adjustable spray hand-held shower head with swivel fitting, pushbutton flow control, 60 inch minimum flexible polished stainless steel hose and in-line vacuum breaker 25 inch grab bar with sliding spray holder that locks at any height to allow the use of the unit as either a hand-held spray or a fixed shower head. Flow shall not exceed 2.5 gpm at 80 psi flow pressure.

D201006 DRINKING FOUNTAINS AND COOLERS

D201006 1.1 - ELECTRIC WATER COOLERS

ARI 1010, wall-mounted, bubbler style, air-cooled condensing unit, 4.0 gph minimum capacity, stainless steel splash receptor, double wall heat exchanger, and all stainless steel cabinet. Provide ASME A112.6.1M concealed chair carriers.

D201006 1.2 - WHEELCHAIR ELECTRIC WATER COOLER

Provide ARI 1010, bi-level wall-mounted bubbler style with ASME A112.6.1M concealed chair carrier, air-cooled condensing unit, 5 gallon/hour minimum capacity, stainless steel splash receptor, and all stainless steel cabinet. Provide 27 inches minimum knee clearance from front bottom of unit to floor and 36 inch maximum spout height above floor. Provide push levers, push bars, or touch pads (one on each side or one on front and both sides of cabinet) to control bubblers. Recess water coolers to maintain full corridor width. All water coolers shall be certified to meet ANSI/NSF 61, Section 9.

D201099 EMERGENCY FIXTURES

D201099 1.1 - COMBINATION EMERGENCY SHOWER & EYEWASH

ANSI Z358.1, column mounted on a floor flange. Design combination unit so components can be operated individually from a common fixture supply line. Provide a self-cleaning, non-clogging 10 inch diameter stainless steel deluge shower head with elbow, full flow stay-open ball valve with pull rod and 8 inch diameter ring or triangular handle one inch interconnecting fittings, with shower head 7 feet above floor and 2 feet from wall. Shower shall deliver a minimum of 30 gpm of water at an inlet supply of 30 psi. Provide a self-cleaning, non-clogging eye and face wash with quick opening,

full-flow valves, stainless steel eye and face wash receptor. Unit shall deliver 3 gpm of aerated water at 30 psig flow pressure, with eye and face wash nozzles 33 to 45 inches above finished floor. Provide copper alloy control valves. Provide an air-gap with the lowest potable eye and face wash water outlet located above the overflow rim by not less than the International Plumbing Code minimum, per IPC Table 608.15.1. Provide a floor drain.

D2020 DOMESTIC WATER DISTRIBUTION

D202001 PIPES & FITTINGS

D202001 1.1 - Copper

Provide Copper tubing and fittings for pipe sizes 4 inches or smaller. Provide type L tubing above ground with either solder fittings, or press-on copper fittings. For buried piping, use type K tubing with either solder fittings, or press-on copper fittings.

D202002 VALVES & HYDRANTS

D202002 1.1 - VALVES

Provide valves at water supplies to fixtures and to provide ease of maintenance as required in the IPC.

D202002 1.2 - HOSE BIBS & HYDRANTS

D202002 1.2.1 - Hose bibs

Provide angle type, copper alloy hose bibbs with vacuum breaker. Provide for mechanical rooms and other interior requirements.

D202002 1.2.2 - Wall Hydrants

Provide along building exterior such that all points along the perimeter can be reached with a 100 foot long hose. Non-freeze, ASSE 1019, cast bronze, with vacuum breaker, locking shield and tee-handle.

D202003 DOMESTIC WATER EQUIPMENT

D202003 1.1 - BACKFLOW PREVENTERS

Reduced pressure principle type. Furnish proof that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current “Certificate of Approval” from the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR)-USC. Listing of the particular make, model/design, and size in the current FCCCHR-USC will be acceptable as the required proof. Provide freeze protection for aboveground exterior applications.

D202003 1.2 - WATER HEATERS

D202003 1.2.1 - Electric Water Heaters

Provide electric water heaters with double heating element per UL 174. Unit efficiency shall meet or exceed that listed for FEMP or ENERGYSTAR,

or as listed in ASHRAE 90.1, whichever is greatest. Water heaters shall be equipped with glass-lined steel tanks, high efficiency type, insulated with polyurethane foam insulation, replaceable anodes, and adjustable range thermostat to allow hot water settings between 110 and 160 degrees F. Water heater warranty shall be a minimum of 5 years.

D202003 1.1.2 - Instantaneous Water Heater (Electric)

UL-499,Heater(s) shall be of the modulating, under the sink, point-of-use type. Output temperature shall be adjustable from 40 degrees F to 160 degrees F. Heating elements shall be field replaceable. Unit(s) shall have a 10-year warranty.

D202003 1.2 - EXPANSION TANKS

Provide steel expansion tank with polypropylene or butyl lined diaphragm at water heater.

D202003 1.3 - WATER METERS

Provide AWWA C701 turbine type, with register reading in U.S. gallons.

D202004 INSULATION & IDENTIFICATION

Provide mineral fiber insulation on all drainage piping that may be subject to condensation. Provide a vapor retarder. Identify above ground pipe with the type of service and direction of flow. Letter size, lengths and colors shall be per ANSI A13.1.

D202004 1.1 - PIPING INSULATION

Provide mineral fiber insulation on domestic water (hot and cold) supply and recirculation piping. Provide vapor retarder on cold water piping.

D202004 1.2 - PIPING & EQUIPMENT IDENTIFICATION

Provide laminated plastic nameplates for equipment and isolation valves. Stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, white with black center core. Minimum size of nameplates shall be 1.0 by 2.5 inches. Lettering shall be minimum of 0.25 inch high normal block lettering. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Each inscription shall identify its function. Equipment nameplates shall show the following information:

a. Manufacturer, type, and model number

b. Contract number and accepted date

c. Capacity or size

d. System in which installed

e. System that it controls

Identify above ground pipe with the type of service and direction of flow. Letter size, lengths and colors shall be per ANSI A13.1.

D202005 SPECIALTIES

D202005 1.1 - VALVE BOXES

For each buried valve provide cast-iron, ductile-iron box of a suitable size. Provide cast-iron or ductile-iron cover for the box with the word "WATER" cast on the cover.

D202005 1.2 - WATER HAMMER ARRESTORS

Provide PDI WH201, water hammer arrestors in lieu of air chambers.

D202005 1.3 - ICEMAKER CONNECTOR BOX

Provide recessed wall box fabricated of hot-dip galvanized steel with epoxy, baked enamel, or powder coat finish. Provide bronze shut-off valve.

D202099 OTHER DOMESTIC WATER SUPPLY

D202099 1.1 - SUPPORTS

Provide piping supports in accordance with the IPC.

D202099 1.2 - INSPECTIONS

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

D202099 1.3 - DISINFECTION

Upon completion of the installation, disinfect all systems per the IPC.

D202099 1.4 - PLUMBING SYSTEMS TESTING

Upon completion of the installation test all systems per the IPC.

D2030 SANITARY WASTE

D203001 WASTE PIPE & FITTINGS

D203001 1.1 - BELOW-GROUND PIPING

Provide plastic PVC piping, fittings, and solvent cement per ASTM D 2665 or ASTM D 1785. Plastic piping shall be equipped with approved firestopping devices as required by code.

D203001 1.2 - ABOVE-GROUND PIPING

Provide cast iron hub and spigot pipe and fittings, rubber compression gasket joints or cast-iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings.

D203001 1.3 - CLEANOUTS

Provide cleanouts as required by the IPC.

D203002 VENT PIPE & FITTINGS

Provide cast iron hub and spigot pipe and fittings, rubber compression gasket joints or cast-iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings. Single drainage/vent stack systems (Philadelphia system, etc) and mechanical air admittance valves are not acceptable.

D203003 FLOOR DRAINS

Floor drains shall be flush strainer type with automatic trap primers or deep seal traps. Provide in mechanical rooms, restrooms, plumbing chase areas, and to receive condensate from air handling equipment. Provide trench drains in Combatant Craft buildings where indicated in Room Requirements.

D2040 RAIN WATER DRAINAGE

D204001 PIPE & FITTINGS

D204001 1.1 - ABOVE-GROUND PIPING

Cast iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings. Where approved for use by the local authority and IPC, plastic PVC or ABS piping, fittings, and solvent cement per ASTM D 2665 or ASTM D 2661 may be used. PVC piping shall be equipped with approved firepstopping devices as required by code. Size and install piping in accordance with the IPC.

D204001 1.2 - BELOW-GROUND PIPING

PVC or ABS to convey the roof drainage from downspouts to a manhole or catch basin in the drainage system. Size and install piping in accordance with the IPC.

D204003 RAINWATER DRAINAGE EQUIPMENT

Where required by building design, provide expansion joint (s) of the proper size to receive the conductor pipe. The expansion joint shall consist of a heavy cast-iron housing, brass or bronze sleeve.

D204004 INSULATION & IDENTIFICATION

Mineral fiber insulation on all drainage piping that may be subject to condensation. Provide a vapor retarder.

D2090 OTHER PLUMBING SYSTEMS

D209003 INTERCEPTORS

D209003 1.1 - OIL/WATER SEPARATOR

Provide an oil/water separator for the trench drains located in the Boat Maintenance Area. Size separator in accordance with the IPC. The separator shall tie into the sanitary sewer system.

D209005 COMPRESSED AIR SYSTEM (NON-BREATHING)

D209005 1.1 - AIR COMPRESSOR

Provide factory packaged electric motor driven, reciprocating air compressor conforming to FS XX-C-2816, except that manufacturer's standard air filter, oil filter, and plug drain shall be provided. Air compressor, aftercooler, and receiver shall be factory packaged as a unit. Receiver tank shall be per ASME PBVC Sec. VIII D1, labeled and rated for 125 PSI gage, equipped with required valves and trimmings, including gage and automatic drain valve and ASME BPVC pressure safety relief valve. Air compressor and receiver shall be sized in accordance with the Compressed Air and Gas Institute (CAGI) guidelines. Locate air compressor away from noise sensitive areas.

D209005 1.2 - COMPRESSED AIR PIPING SYSTEM

Piping shall conform to the requirements of ASME B31.1 for materials, assembly, and testing. Piping shall be [steel, black seamless schedule 40 carbon steel per ASTM A53 with threaded fittings] [or] [copper tubing per ATM B 88, Type K or Type L, hard drawn, Class 1, with wrought copper or bronze fittings. Provide compressed air drops 2 per Boat Maintenance Bay, with quick disconnects throughout the work areas to allow connection of pneumatic tools, air guns, etc. Each air drop shall be equipped with a filter/moisture separator, pressure gauge, air pressure regulator, and a quick-disconnect.

-- End of Section --

SECTION D30

HVAC
07/04

TABLE OF CONTENTS

D30 GENERAL

D30 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the design and construction of interior mechanical systems for the Riverine and Combatant Craft Operations Facility. This section covers installations inside the facility and out to the five foot line. See Section G30 “Site Mechanical Utilities” for continuation of systems beyond the five-foot line.

D30 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (URML) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

D30 1.2.1 - Industry Standards and Codes

INTERNATIONAL FUEL GAS CODE (IFC)

INTERNATIONAL MECHANICAL CODE (IMC)

INTERNATIONAL PLUMBING CODE (IPC)

D30 1.2.2 - Government Standards

Federal Energy Management Program (FEMP)

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 3-420-10N, “Design: General Plumbing Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standard for Buildings”

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 23 08 00.00 20 “HVAC Testing/Adjusting/Balancing”

UFGS 23 09 23 “Direct Digital Control for HVAC and Other Local Building Systems”

D30 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01 "Design: General Building Requirements"

UFC 1-300-10N "Design Procedures"

UFC 3-400-10N, "Design: General Mechanical Requirements"

UFC 3-420-10N, “Design: General Plumbing Requirements”

UFC 3-800-10N "Design: General Environmental Requirements"

UFC 4-010-01, "DoD Minimum Antiterrorism Standard for Buildings"

D30 1.3.1 - Mechanical System

Provide an interior mechanical system as described in the Project Program including accessories and devices as necessary and required for a complete and usable system.

D30 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with the industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

D30 1.4.1 - Material Standards

Materials, equipment, fixtures, and other appurtenances shall comply with applicable Underwriters Laboratories, (UL) Inc., American National Standards Institute, Inc., and National Electrical Manufacturer’s Association standards or applicable standards of a similar independent testing organization. All materials shall be new, and shall bear the label of Underwriters Laboratories whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer’s recommendations. All insulation shall be asbestos free.

D30 1.4.1.1 - Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place, the nameplate of the distributing agent will not be acceptable.

D30 1.4.1.2 - Refrigerants

Refer to UFC 3-400-10N for allowable refrigerant requirements.

D30 1.4.2 - Anti-terrorism

Design shall include the anti-terrorism requirements indicated in UFC 4-010-01.

D30 1.4.3 - Training

After installation of the equipment and systems, provide individual training courses for two Government personnel for each of the items listed below, covering items contained in the Operations and Maintenance manuals. Provide one copy of the Operations and Maintenance manuals for each two course attendees. Provide one DVD disc of the training courses to be used as refresher courses and to train additional personnel. Training shall be conducted by the same factory trained engineer that supervised the installation of the system. Training shall include classroom discussion as well as hands on maintenance, replacement of

typical components and repair type maintenance training for parts typically replaced or repaired in the field. Submit training plan 30 calendar days prior to training sessions. Training plan shall include scheduling, content, outline, and training material handouts. Provide training for:

Chillers

Boilers

Air Handling Equipment

DDC Control System

D30 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory HVAC system performance shall be via Performance Verification Testing, as detailed in this section.

Verification of compliance with ASHRAE 90.1 requirements will be determined by a review of the submitted Compliance Documentation Forms from the ASHRAE 90.1 User's Manual.

D30 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures”, UFC 1-300-10N "Design Procedures", UFC 3-420-10N, “Design: General Plumbing Requirements”, and UFC 3-400-10N, “Design: General Mechanical Requirements”.

D30 1.6.1 - DESIGN SUBMITTAL SPECIFICATION

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

D30 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N “Construction Submittal Procedures”:

SD-03 Product Data

Water chiller; G

Condensing Units; G

Piping, fittings, valves, instrumentation and appurtenances; G

Ductwork and accessories; G

Air handling equipment (AHU, variable air volume boxes, fan coil units, exhaust fans, etc.); G

Pumps; G

Electric motors; G

Mechanical insulation; G

Boilers, Burners and Control Equipment, Boiler Trim and Control Equipment, Stack, Breeching, and Supports; G

For each product, component, and system specified in this section that uses refrigerants, provide a statement certifying that they meet the specified requirements in UFC 3-400-10N; G

SD-06 Test Reports

Start-up and operational tests for the water chiller; G

Start-up and operational tests for the boiler; G

TAB agency's design review report; G

TAB agency's pre-field TAB engineering report; G

Certified TAB report; G

Certified DALT report; G

Commissioning Report; G

Performance Verification Plan; G

SD-07 Certificates

Certificate of Readiness.

Submit a Certificate of Readiness stating that all equipment, systems, and controls are now complete and ready for functional performance testing to begin. Completed pre-start and start-up checklists, signed by the responsible parties including the Commissioning Agent, shall support the certificate. The TAB field work shall not commence until the start-up checklists have been completed and signed. Final system performance verification testing of the TAB and controls will not be conducted until the Certificate of Readiness is submitted to the Contracting Officer.

Piping welding procedures, performance qualifications, and list of welder's names and symbols. Submit per ASME/ANSI B31.9.

Independent Testing, Adjusting and Balancing (TAB) agency personnel qualifications. G

SD-10 Operation and Maintenance Data

Submit data packages in accordance with Section 01781, “Operation and Maintenance Data”.

Water chiller, Data Package 3; G

Condensing units, Data Package 3; G

Air handling equipment (AHU, variable air volume units, fan coil units, exhaust fans), Data Package 3; G

Pumps, Data Package 2; G

Boilers, Data Package 3; G

Adjustable Frequency Drives, Data Package 5; G

SD-11 Closeout Submittals

Posted operating instructions: G

Final TAB Report; G

Updated Commissioning Report; G

D3010 ENERGY SYPPLY

D301002 GAS SUPPLY SYSTEM

D301002 1.1 - NATURAL GAS PIPING

Conform to requirements of the International Fuel Gas Code. Conform to requirements of ASME B31.8, "Gas transmission and Distribution Piping Systems" for exterior piping. Conform to requirements of NFPA 54, "National Fuel Gas Code" for interior gas piping. Provide meter and pressure regulator. Obtain natural gas pressures from the local gas company, (MSS – Mississippi Space Services). Contractor is responsible for providing the complete natural gas system to the facility, including any applications and permits.

D301002 1.2 - MATERIALS AND EQUIPMENT

D301002 1.2.1 - Aboveground Within Buildings: Black steel per ASTM A 53, Schedule 40, threaded ends for sizes 2 inches and smaller; otherwise, plain end beveled for butt welding.

D301002 1.2.2 - Underground: Provide Polyethylene (PE) pipe conforming to ASTM D 2513 for 100 PSI gage working pressure. Standard Dimension Ratio shall be 11.5 maximum. Provide detectable aluminum plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of direct buried piping. Tape shall be detectable by an electronic detection instrument. Polyethylene Fittings shall be ASTM D 2683 socket fittings or ASTM D 2513 molded butt-fusion fittings.

D301002 1.2.3 - Steel Pipe Fittings: Provide ANSI/ASME B16.3, black malleable iron threaded fittings or ASME/ANSI B16.9, butt-welding fittings. Unions shall be ASME/ANSI B16.39, black malleable iron. Flanges and flanged fittings shall be ASME/ANSI B16.5 steel flanges or convoluted steel flanges conforming to ASME BPVC SEC VIII D1. Flange faces shall have integral grooves of rectangular cross sections, which afford containment for self-energizing gasket material.

D301002 1.3 - PRESSURE TESTS

Pressure test per NFPA 54 at 1.5 times maximum working pressure, but in no case less than 50 PSI.

D3020 HEAT GENERATING SYSTEMS

D302002 HOT WATER BOILER

D302002 1.1 - HOT WATER BOILERS

D302002 1.1.1 - Provide steel firebox boilers with power burners for an input under 1000 MBTUH.

D302002 1.1.2 - Provide modified scotch marine boilers with power burners for input equal to or over 1000 MBTUH.

D302002 1.2 - Efficiency: Boilers efficiency shall meet or exceed that listed for FEMP or ENERGYSTAR, or as listed in ASHRAE 90.1, whichever is greatest.

D302002 1.3 - Boiler shall be designed, tested, and installed per ASME CSD-1 (Controls and Safety Devices) and ASME BPVC (Boiler and Pressure Vessel Code). The boiler shall meet the requirements of the UL 795, NFPA 85, ANSI Z83.3, and ASME CSD. Boiler and associated hot water pumps shall be located in a mechanical room inside the facility. Clearance shall be provided around boilers to allow access for inspection, maintenance, and repair.

D302002 1.4 - BOILER BURNER

Provide a natural gas power burner. Interrupted pilot type ignition system and pilot shall be the electrode-ignited natural gas type. Burners provided shall be the make, model and type certified and approved by the manufacturer of the boiler being provided. Burner controls and safety equipment shall conform to ASME CSD-1. The combustion control system shall be of the high-low-off type or full modulation type.

D302002 1.5 - ADDITIONAL ASME CSD-1 REQUIREMENTS

The safety interlock switches and limit controls required by ASME CSD-1 shall be extended to include the following additions:

D302002 1.5.1 - Provide safety shutdown caused by loss of combustion air on burners with an input of 117 kW (400,000 BTUH) input and greater.

D302002 1.5.2 - Provide safety shutdown caused by high and low pressure in the gas piping of gas-fired burners with an input of 117 kW (400,000 BTUH) input and greater.

D302002 1.5.3 - Provide fuel gas piping safety shut-off valves for gas-fired burners with an input of 117 kW (400,000 BTUH) input and greater.

D302002 1.6 - BOILER TRIM AND CONTROL EQUIPMENT

D302002 1.6.1 - Boiler Controls: Mount controls, including operating switches, indicating lights, gages, alarms, motor starters, fuses, and circuit elements of the control systems, on a single control panel mounted on the burner.

D302002 1.6.2 - Boiler Trim: Comply with ASME BPVC SEC IV, ASME CSD-1, and additional appurtenances as specified herein.

D302002 1.6.3 - Pressure Gages: Provide pressure gages with a scale equivalent to 1.5 times the outlet water pressure on supply water piping and return water piping.

D302002 1.6.4 - Thermometers: Provide thermometers with a scale equivalent to 1.5 times the outlet water temperature on supply water piping and return water piping.

D302002 1.6.5 - Drain Trapping: Provide drain valve and piping to a floor drain.

D302002 1.6.6 - Air Vent Valve: Provide with screwed connection, stainless steel disk, and stainless steel seats to vent entrapped air.

D302002 1.7 - BOILER STACK AND ACCESSORIES

Provide insulated boiler stack in accordance with manufacturer's recommendations and conform to NFPA 211. Provide flue gas thermometer and mount in flue gas outlet.

D302002 1.8 - BOILER STARTUP AND OPERATIONAL TESTS

D302002 1.8.1 - Boiler Cleaning: Prior to startup, clean boilers in accordance with ASME Boiler and Pressure Vessel Code and manufacturer’s recommendations.

D302002 1.8.2 - Operational Tests: Furnish the services of an engineer or technician approved by the boiler manufacturer for installation, startup, operational and safety testing. Demonstrate proper operability of combustion control, flame safeguard control, and safety interlocks.

D302006 EQUIPMENT THERMAL INSULATION

Insulate hot and chilled water pumps and equipment as suitable for the temperature and service in rigid block, semi-rigid board, or flexible unicellular insulation to fit as closely as possible to equipment. Provide vapor retarder for chilled water applications.

D3030 COOLING GENERATING SYSTEMS

D303001 CHILLED WATER SYSTEMS

D303001 1.1 - WATER CHILLERS

D303001 1.2 - AIR-COOLED CHILLERS

Air-cooled rotary screw with slide valve modulation or scroll type per ARI 550/590-98. Chiller efficiencies shall meet or exceed that listed for FEMP or ENERGYSTAR, or as listed in ASHRAE 90.1, whichever is greatest. The IPLV of the unit shall not be less than the “Best Available” IPLV listed in the FEMP. Provide control panel with the manufacturers’ standard controls and protection circuits. Provide a control interface for remote monitoring of the chiller's operating parameters, functions and alarms from the DDC control system central workstation.

D303001 1.2.1 - Provide a minimum of two (2) independent refrigerant circuits.

D303001 1.2.2 - Provide minimum of 4 stages of unloading.

D303001 1.2.3 - Provide head pressure control for operation down to 20 degrees F. Provide freeze protection for chiller and piping.

D303001 1.2.4 - Provide copper tube, aluminum fins for condenser coils with immersion applied, baked phenolic or other approved coating or copper tube/copper fin construction. Field applied coatings are not acceptable. Provide manufacturer's optional louvered covers or hail guards for condenser coils to provide protection against vandalism, debris, or hail.

D303002 DIRECT EXPANSION SYSTEMS

Anti-corrosion coating shall be immersion applied, baked phenolic or other approved coating. Field applied coatings are not acceptable. Direct Expansion equipment efficiencies shall meet or exceed that listed for FEMP or ENERGYSTAR, or as listed in ASHRAE 90.1, whichever is greatest.

D303002 1.2 - CONDENSING UNITS

Provide air-cooled, split system air conditioner with ducted air distribution. Provide units factory assembled, designed, tested, and rated in accordance with ARI 210/240 or ARI 340/360. Provide manufacturer's minimum recommended clearance around condensing units. Refrigerant piping size shall be per the manufacturer's recommendations. Insulate refrigerant piping suction lines and condensate drain. Provide low ambient controls.

D3040 DISTRIBUTION SYSTEMS

D304001 AIR DISTRIBUTION, HEATING & COOLING

D304001 1.1 - DUCTWORK

Ductwork is prohibited in unventilated crawlspaces and beneath or in concrete slabs on grade. Ductwork in ventilated crawlspaces shall not be in contact with the ground. Except as specified herein, provide galvanized steel ductwork constructed, braced, reinforced, installed, supported, and sealed per SMACNA standards.

D304001 1.1.1 - Use insulated flexible duct only for connections to air distribution devices to adapt to minor offsets. Flexible duct shall be UL 181 listed and per SMACNA DCS with a minimum R value of 4. Maximum length of flexible ductwork shall be 6 feet.

D304001 1.1.2 - Provide flexible connectors between fans and ducts.

D304001 1.1.3 - Provide manual volume dampers in each branch take-off from the main duct to control air quantity. Dampers shall conform to SMACNA DCS.

D304001 1.1.4 - Fire dampers shall be rated per UL 555. Fire dampers shall be dynamic type rated for closure against a moving airstream. Provide fire dampers that do not intrude into the air stream when in the open position.

D304001 1.1.5 - Smoke dampers shall be rated per UL 555S.

D304001 1.2 - LOUVERS & HOODS

D304001 1.2.1 - Louvers shall bear AMCA ratings seal for air performance and water penetration in accordance with AMCA 500 and AMCA 511. Louvers shall be constructed of anodized aluminum alloy. Provide birdscreens.

D304001 1.3 - GRILLES, REGISTERS, & DIFFUSERS

Provide factory-finished grilles, registers, and diffusers constructed of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded.

D304001 1.4 - INSULATION

Provide external thermal insulation for all ductwork. Insulate ductwork in concealed spaces with blanket flexible mineral fiber. Insulate ductwork in Mechanical Rooms and exposed locations with rigid mineral fiber insulation. Provide insulation with factory applied all-purpose jacket with integral vapor retarder. In exposed locations, provide a jacket with white surface suitable for painting. Flame spread/smoke developed rating for all

insulation shall not exceed 25/50. Minimum insulation thickness shall be the minimum thickness required by ASHRAE 90.1. Insulate the backs of all supply air diffusers with blanket flexible mineral fiber insulation.

D304001 1.5 - VAV BOXES

Provide pressure-independent type variable air volume units rated per ARI 880. Boxes shall not be allowed to fully shut-off. Provide each box with a hot water coil. Provide electronic controls. Provide factory insulation.

D304003 HOT WATER DISTRIBUTION SYSTEMS

D304003 1.1 - Hot water piping shall be electric resistance welded or seamless Schedule 40 black steel pipe conforming to ASTM A 53. Piping 4 inch and smaller may be ASTM B 88 Type K or L copper.

D304003 1.2 - Steel Pipe Fittings: For piping 2 inch and smaller, provide ANSI/ASME B16.3 malleable iron screwed fittings or ASME B16.11 socket welding (Class 3000) or threaded type (Class 2000). Provide ASME/ANSI B16.9 butt-welding fittings or ASME/ANSI B16.5 flanged type for piping 2-1/2 inch and larger. Grooved joint pipe coupling systems of appropriate pressure rating are acceptable in lieu of welded or screwed fittings.

D304003 1.3 - Copper Fittings: Provide ANSI B16.18 cast bronze solder joint type or ASME/ANSI B16.22 wrought copper solder joint type.

D304006 1.4 - Insulate hot water piping with mineral fiber insulation with factory-applied all-purpose jacket. Thickness shall meet or exceed the thickness listed in ASHRAE 90.1.

D304003 1.5 - Provide appropriately sized relief valves and valves as necessary to balance water flows and/or isolate equipment for service and repairs, and as otherwise required.

D304003 1.6 - Provide appurtenances such as air separators, expansion tanks, suction diffusers, strainers, etc. for hot water systems.

D304003 1.7 - Provide test ports in piping at inlet and outlet of all major system components including boilers, pumps, etc.).

D304006 CHILLED WATER DISTRIBUTION SYSTEMS

D304006 1.1 - Underground Chilled Water Piping: Provide new exterior buried, factory-prefabricated, pre-insulated, chilled water piping systems. Piping systems shall consist of a steel or copper carrier pipe with polyurethane insulation and a high-density polyethylene jacket. All fittings and accessories shall be designed and factory-fabricated to prevent moisture from entering into the system. Backfill and overall installation shall meet the requirements of the IMC. The piping installation shall be approved and certified in the field by a representative of the piping system manufacturer. Provide locator tape above all underground piping.

D304006 1.2 - Aboveground chilled water piping shall be electric resistance welded or seamless Schedule 40 black steel pipe conforming to ASTM A 53. Piping 4 inch and smaller may be ASTM B 88 Type K or L copper.

D304006 1.3 - Steel Pipe Fittings: For piping 2 inch and smaller, provide ANSI/ASME B16.3 malleable iron screwed fittings or ASME B16.11 socket welding (Class 3000) or threaded type (Class 2000). Provide ASME/ANSI B16.9 butt-welding fittings or ASME/ANSI B16.5 flanged type for piping 2-1/2 inch and larger. Grooved joint pipe coupling systems of appropriate pressure rating are acceptable in lieu of welded or screwed fittings.

D304006 1.4 - Copper Fittings: Provide ANSI B16.18 cast bronze solder joint type or ASME/ANSI B16.22 wrought copper solder joint type.

D304006 1.5 - Insulate above ground chilled water piping with cellular glass insulation. Flexible unicellular insulation may be used on small piping runouts. Provide all-purpose jacket with vapor retarder.

D304006 1.6 - Provide relief valves and valves as necessary to balance water flows and/or isolate equipment for service and repairs, and as otherwise required.

D304006 1.7 - Provide test ports in piping at inlet and outlet of all major system components including chillers, pumps, etc.

D304006 1.8 - Where necessary, install an inertia tank in the chilled water loop to achieve the required minimum system volume. Provide an insulated, inertia tank of sufficient volume in accordance with the chiller manufacturer's recommendations. Install the chilled water inertia tank downstream of the chiller and upstream of the cooling coils.

D304007 EXHAUST SYSTEMS

D304007 1.1 - FANS

Fans shall be AMCA 210 certified, with AMCA seal. Fan bearings shall have a minimum average life of 200,000 hours at design operating conditions. Provide bird screens for outdoor inlets and outlets. Provide fans with integral disconnect. Coordinate technical and aesthetic requirements and location of building exhaust or attic cooling fans with architectural requirements. As far as practicable, locate fans such that they are readily accessible for maintenance. Fans located in attics, on roofs, or in other areas where access is limited shall be direct-drive type with means for verifying operation via the building DDC system to eliminate belt maintenance.

D304007 1.2 - IN-LINE FANS

Provide centrifugal fan(s).

D304007 1.3 - WALL FANS

Provide propeller or centrifugal fan(s) with backdraft dampers, fan guards and wall bracket.

D304007 1.4 - ROOFTOP FANS

Provide centrifugal fan(s) with roof curb.

D304008 AIR HANDLING UNITS

Provide AMCA 210 certified fans with AMCA seal. Fan bearings shall have a minimum average life of 200,000 hours at design operating conditions. Provide bird screens for outdoor inlets and outlets. Provide 35% prefilters and 85% final filters as defined in ASHRAE.

D304008 1.1 - CENTRAL STATION AIR HANDLERS

Provide modular construction, double wall air handling units with minimum of 1 inch casing insulation. Provide ARI 430 certified fans and ARI 410 certified coils. Provide stainless steel, positive draining condensate drain pan.

D304008 1.2 - SPLIT SYSTEM AIR HANDLERS

Provide factory assembled, packaged air handling unit rated in accordance with ARI 210/240 or ARI 340/360. Provide matched components with the condensing unit from the same manufacturer.

D304099 OTHER DISTRIBUTION SYSTEMS

D304099 1.1 - PUMPS

Provide centrifugal circulating pumps with motor, motor starter, and motor enclosure conforming to the appropriate NEMA standards. Provide suction diffusers on base-mounted pumps. Insulate pumps used for hot service and chilled water service.

D304099 1.1.1 - In-Line Pumps

Provide pumps constructed of manufacturer’s standard materials suitable for chilled, condenser, and hot water heating systems.

D304099 1.1.2 - Base Mounted Pumps

Provide single stage end suction pumps suitable for chilled, condenser, and hot water heating systems.

D304099 1.2 - VARIABLE FREQUENCY DRIVES (VFD)

Provide factory-assembled variable frequency drive control systems for variable speed control. All air handling unit and pump VFD’s shall be from the same manufacturer. Each VFD shall include motor starter, motor disconnects and controls as required for a complete system. Units shall be UL-listed and comply with the National Electric Code.

Provide the following accessories:

a. Disconnect switch

b. Control circuit transformer, with primary and secondary fuses

c. Manual bypass

d. System hand-off-auto switch with provisions for remote start/stop of the system.

e. System initialized light

f. Run light

g. Failure alarm

h. LCD digital display with numeric keypad

i. A control interface provided for remote monitoring of AFD functions and alarms from the DDC control system computer.

D304099 1.3 - CHILLED WATER AND HOT WATER AIR SEPARATORS

Provide ASME rated air separators with tangential inlet and outlet connections and automatic air vent.

D304099 1.4 - CHILLED WATER AND HOT WATER EXPANSION TANKS

Provide ASME rated expansion tanks with polypropylene or butyl diaphragm.

D304099 1.5 - MAKEUP WATER STATION

Provide a water pressure-reducing valve, filter and relief valve in the make-up water line to the chilled and hot water systems to maintain the operating pressure. Provide a 3/4 inch globe valve by-pass around this pressure reducing station. Provide reduced pressure backflow preventer upstream of the by-pass.

D304099 1.6 - CONDENSATE DRAIN PIPING

Provide ASTM B 88, Type M or L, hard drawn copper.

D304099 1.7 - CONDENSATE DRAIN INSULATION

Insulate condensate drain piping with flexible cellular insulation.

D304099 1.8 - CHEMICAL TREATMENT

Provide chilled and hot water systems with chemical treatment system for the control of pH, scale formation, and corrosion inhibition. Provide shot-type feeders for manual chemical feed. Feeders shall be rated for use with pressures up to 130 PSI gage. Provide chemicals in accordance with EPA and equipment manufacturer’s recommendations.

D304099 1.9 - PIPING IDENTIFICATION

Provide piping identification labels or Stencil names or code letters for piping systems in clearly visible letters and symbols. Provide arrow-shaped markings to indicate direction of flow.

D304099 1.10 - PIPE SLEEVES

Provide pipe sleeves at each wall and floor penetration. The sleeve shall be of a material suitable to protect the carrier pipe (two pipe sizes larger) and sealed with an appropriate flexible material. Provide fire stopping in fire rated walls in accordance with IBC.

D304099 1.11 - SYSTEM FLUSHING

Thoroughly flush hydronic systems prior to system startup.

D304099 1.12 - HEAT TAPE

Provide UL-Listed, self-regulating, heat tape on piping subject to freezing.

D3050 TERMINAL & PACKAGE UNITS

D305002 UNIT HEATERS

D305002 1.1 - HOT WATER

Provide factory assembled, vertical discharge unit heaters.

D305005 ELECTRIC HEATING

D305005 1.1 - UNIT HEATERS

Provide factory assembled, UL-1025, horizontal discharge unit heaters.

D3060 CONTROLS AND INSTRUMENTATION

D306001 HVAC CONTROLS

D306001 1.1 - DIRECT DIGITAL CONTROLS

Provide Direct Digital Controls (DDC) to comply with UFGS 23 09 23, “Direct Digital Control for HVAC and Other Local Building Systems”. The Designer of Record shall utilize UFGS Specification Section 23 09 23, “Direct Digital Control for HVAC and Other Local Building Systems” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project. Provide a direct digital control (DDC) system that will communicate with the existing DDC system. The existing DDC system was manufactured by Siemens APOGEE.

D306001 1.2 - INSTRUMENT PANELS

D306001 1.2.1 - Equipment Controllers

DDC hardware shall be UL-916 rated. Use controllers in a distributed control manner. Controllers shall be stand alone with an internal clock and modem. The total number of I/O hardware points shall not exceed 48 in any controller. Provide sufficient memory for each controller to support required control, communication, trends, alarms, and messages. Provide communications ports for controller to controller, on-site interface, remote workstation interface, and telecommunications interface.

D306002 ELECTRONIC CONTROLS

Provide programmable thermostats with built in keypads for scheduling of day and night temperatures with two setback periods per day. Provide independent summer and winter programs. Thermostats shall have temporary and manual override of schedule and battery backup.

D3070 SYSTEMS TESTING AND BALANCING

D3070 1.1 - HVAC SYSTEM

Provide System Testing and Balancing to comply with UFGS 23 08 00.00 20, “HVAC Testing/Adjusting/Balancing”. The Designer of Record shall utilize UFGS Specification Section 23 08 00.00 20, “HVAC Testing/Adjusting/ Balancing”, for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

D307001 WATER SIDE TESTING & BALANCING – HEATING & COOLING

Refer to paragraph D3070.

D307002 AIR SIDE TESTING & BALANCING – HEATING, COOLING & EXHAUST

Refer to paragraph D3070.

D307003 HVAC COMMISSIONING

D307003 1.1 - Commission the HVAC systems per the Commissioning Plan of this section. Commissioning will include testing, adjusting, and modifying of the HVAC systems as well as training of personnel as required to ensure that the HVAC systems operation conforms to the requirements of this section.

D307003 1.2 - After acceptance by the Contracting Officer, modify OMSI manuals as required, including providing all Commissioning Reports, and submit the Final OMSI manuals per the requirements of Section 01782, "Operation and Maintenance Data".

D307003 1.3 - Develop and submit a Level 2 Commissioning Plan per the SMACNA HVAC Commissioning Manual to define the on-site activities for commissioning the HVAC systems. The Commissioning Plan shall incorporate all requirements of this section of the RFP and include the following:

D307003 1.3.1 - The commissioning agent will be appointed by the HVAC contractor and the commissioning authority will be the Mechanical Engineer of record for the project.

D307003 1.3.2 - Provide a schedule of inspections during construction that includes periodic inspections by the system designer. Specify a minimum of 3 inspections. One of the visits shall coincide with item 3 below.

D307003 1.3.3 - Provide a schedule for verification and functional performance tests. System designer shall be present for the functional performance tests.

D307003 1.3.4 - Provide a schedule detailing training sessions for Government personnel. Training sessions are to address maintenance and operation of HVAC equipment, control system components, and overall sequence of operation for the HVAC system.

D307003 1.3.5 - Define the sequence for starting and balancing air distribution systems to ensure construction materials, such as architectural finishes, are installed under the appropriate environmental conditions. Also address the procedure that will be used to "dry out" the structure.

D3090 OTHER HVAC SYSTEMS AND EQUIPMENT

D309001 GENERAL CONSTRUCTION ITEMS

D309001 1.1 - FORCE PROTECTION

Comply with Force Protection Criteria.

-- End of Section --

SECTION D40

FIRE PROTECTION
06/06

D40 GENERAL

D40 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for the fire protection systems for the building, including sprinkler systems, and fire extinguishers. Fire alarm system requirements are located in this section under paragraph D503001.

D40 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Other applicable industry standards that are referenced in the section text that are not found in the UMRL are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

D40 1.2.1 – Industry Standards and Codes

See paragraph above.

D40 1.2.2 – Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 3-600-01, “Design: Fire Protection Engineering for Facilities”

UFC 4-010-01, “DOD Minimum Antiterrorism Standards for Buildings”

UFC 4-021-01, “Design and O & M: Mass Notification Systems (MNS)”

D40 1.3 – GENERAL REQUIREMENTS

All work shall comply with design standards as a minimum:

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

D40 1.4 – QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed or corrective measures taken, to assure compliance with the referenced standard.

D40 1.4.1 – Design/Build Fire Protection Engineer

The design/build contractor shall have a firm contractual agreement with a Qualified Fire Protection Engineer (DBFPE). The contractor shall provide a copy of the agreement to the government at the time of the Pre-Construction meeting. The DBFPE shall be an integral part of the design team and shall be involved in every aspect of the design as it relates to fire protection, which includes, but is not limited to, building code analysis, life safety code analysis, design of automatic detection and suppression systems, water supply analysis, and a multi-discipline review of the entire project. The DBFPE can be used as a technical representative for any of the equipment manufacturers during system testing. The DBFPE shall review all fire protection submittals and certify in writing that the design is in compliance with all applicable codes. The DBFPE shall forward one copy of each submittal with review comments and annotated transmittal sheet to NAVFAC Southeast, CODE CI62, 2155 EAGLE DRIVE, P.O. BOX 190010, NORTH CHARLESTON SC 29419-9010 immediately upon completion of the review and at least 14 calendar days prior to actual construction.

D40 1.4.1.1 - Qualified Fire Alarm Installer

The installing subcontractor shall have a minimum NICET Level III technician to oversee the design and installation of the fire alarm system in conjunction with the DBFPE. Drawings shall be stamped for conformance with NFPA codes, equipment manufacturer and contract requirements by the DBFPE and also signed by the NICET level III technician.

D40 1.4.2 - Performance Verification Testing

The DBFPE shall witness all preliminary and final acceptance tests of all fire protection and mass notification systems. Contractor shall perform complete functional preliminary tests of all systems to assure operable status before requesting the final acceptance tests. Preliminary tests shall include hydrostatic testing and flushing in accordance with NFPA 13. Piping above ceilings shall be tested, inspected, and approved before installation of ceilings. Preliminary tests shall also include ground resistance testing, dielectric strength and insulation resistance testing, smoke detector sensitivity testing,

manometer testing of all duct smoke detector housings and operational testing of all system control features. Smoke detector sensitivity tests shall be conducted and recorded. Test the alarms; tamper switches; and, other devices. Test the water flow alarms by flowing water through the inspector's test connection. When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in NFPA 13 and /or NFPA 72 with a request for formal inspection and tests at least 15 days prior to inspection date. Final acceptance tests shall be conducted in the presence of the NAVFAC SOUTHEAST FPE and Contracting Officer field representative only after all discrepancies discovered during the preliminary testing have been rectified. All systems shall be operated to demonstrate compliance with contract requirements and respective NFPA codes. Test procedures shall be in full compliance with the respective NFPA codes, the equipment manufacturer recommendations, and UFC 3-600-10N. Complete functional testing of the fire alarm system includes but is not limited to wiring supervision, detector sensitivity, and manometer testing and sound level measurement. Provide all personnel, equipment, and materials for tests. The systems manufacturer technical representative shall be present for the final inspection and test. Make any changes in panel software as directed during the tests. Fire pump tests shall be conducted in the presence of the pump, controller, and engine manufacturer technical representatives. The fire pump manufacturer shall be present for the preliminary and final inspection, as well as for the test of the fire pump system. Return trips to witness repeat acceptance test due to failure of previous tests will be at the Contractor’s expense. The DBFPE shall prepare a written report detailing compliance of any outstanding submittal review comments, summarizing the results of all tests, detailing all discrepancies discovered, corrective action taken, and all forms as required by the respective NFPA codes, and recommendations / certifications for acceptance. Forward one copy of the report with attachments to NAVFAC SOUTHEAST, CODE CI62, 2155 EAGLE DRIVE, P.O. BOX 190010, NORTH CHARLESTON SC 29419-9010. **Beneficial occupancy of the facility cannot occur until all fire protection systems have been accepted.**

D40 1.4.2.1 - Fire Extinguishers and Cabinets

The fire extinguisher cabinets shall be inspected by the DBFPE prior to the enclosure of the walls and/or ceilings surrounding the cabinets. A report, including pictures, shall be provided to NAVFAC SOUTHEAST Fire Protection Engineer for approval. Any concerns shall be brought to NAVFAC SOUTHEAST Fire Protection Engineer.

D40 1.4.2.2 – Fire Hydrants

The fire hydrants shall be inspected by the DBFPE prior to backfilling the piping surrounding the fire hydrants. A report, including pictures, shall be provided to NAVFAC SOUTHEAST Fire Protection Engineer for approval. Any concerns shall be brought to NAVFAC SOUTHEAST Fire Protection Engineer.

D40 1.4.3 – Training

(a) The contractor shall provide training for the active systems within 6 weeks of final acceptance of the systems.

(b) The training for the active systems shall consist of three (3) eight (8)-hour sessions to accommodate all shifts of the base fire department and shall allow for rescheduling for unforeseen fire department responses. The training shall be scheduled at least 2 weeks in advance.

(c) Fire Alarm and Mass Notification Systems as follows:
Equipment manufacturer shall provide four days of technical training to the Government on site. Training shall allow for classroom instruction as well as individual hands on programming, trouble-shooting and diagnostics exercises.

D40 1.5 – COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory fire protection system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

D40 1.6 – DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

Construction specifications are not required for the fire protection suppression systems. In lieu of specifications, submit a basis of design narrative demonstrating understanding of and compliance with this section. Narrative shall include, but is not limited to, design densities, design areas, applicable codes, etc. Submit manufacturer’s data sheets for all items of the Fire Protection Systems. Design narrative shall be written by the DBFPE.

D40 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracket options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

D40 1.7 – CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Drawings shall comply with the respective NFPA codes. Provide complete submittal data for all components proposed to be utilized. On data submittal sheets where more than one product is described, clearly annotate which product(s) are to be supplied. Do not procure equipment or start installation prior to receiving system approval from the NAVFAC SOUTHEAST Fire Protection Engineer.

Drawings shall be stamped for conformance with NFPA codes, equipment manufacturer and contract requirements by the DBFPE and also signed by the installing subcontractor National Institute for Certification in Engineering Technologies (NICET) level III technician. The installing contractor may provide the signature of a US registered professional fire protection engineer in lieu of the NICET III technician, if there are no NICET III technicians in the geographic area. The NAVFAC SOUTHEAST FPE reserves the right to overrule any and all approvals.

All submittals shall be reviewed and approved by NAVFAC SOUTHEAST FPE.

Provide scaled drawings a minimum size 600 x 900 mm (24 x 36 inches). Scale of drawings shall be large enough to be legible and clear. Sealing of drawings, if required, shall be the responsibility of the DBFPE.

Fire Sprinkler Systems; G

Provide detail-working drawings of system layout in accordance with NFPA 13, “Working Drawings (Plans)”.

Fire Alarm System Plans

Provide detail-working drawings of system layout that include the following:

1. Fire detection and alarm layout plans showing the location of fire alarm control panels, all fire alarm system initiating and indicating devices, monitor and control modules, relays, door closures. On the floor plans, show conduit routing, circuit identification, wire counts, extender panels, etc. Provide the notification appliance circuit maximum output vs. actual load.

Fire alarm riser diagrams showing hierarchy, arrangement and interlocks necessary for associated controls. Provide a schedule of signals to be transmitted to the base receiving station. A sequence of operation shall be submitted with the fire alarm submittal in a matrix format.

SD-03 Product Data

Valves, including gate, check, riser, globe, flow control and relief; G

Sprinklers; G

Pipe; G

Fittings; G

Fire department connections; G

Water flow and tamper switches; G

Pipe hangars and support; G

Back-flow preventer; G

Low and High Air Pressure Supervisory Switch; G

Air Compressor, air maintenance device; G

Fire Protection System as follows:

Control panel and all integral components; G
Manual pull stations; G
Smoke detectors; G
Audio/visual devices; G
Line voltage surge suppressors; G
Local sprinkler water flow alarm bell; G
Heat detectors; G
Radio transmitter; G

SD-05 Design Data

Hydraulic Calculations; G

Submit hydraulic calculations to substantiate compliance with hydraulic design requirements. These calculations shall be generated from a commercially available computer program dedicated to producing hydraulic calculation for sprinkler systems. Submit the name of the software program used.

Provide a graph of Supply vs. Demand on scaled logarithmic graph paper.

Fire Alarm and Mass Notification Systems; G

Provide standby battery calculations. The calculations shall be based on the maximum output of each circuit or module provided. Show the individual notification appliance circuit loading calculations.

SD-06 Test Reports

Preliminary test reports on piping systems; G

SD-07 Certificates

Above and Below Ground Piping Systems (Similar to those required by NFPA 13 and 24); G

Fire alarm system Certificate of Completion; G

SD-10 Operation and Maintenance Data

Valves; G

Wet and Dry-pipe sprinkler system equipment; G

Submit Data Package 2, with wiring diagrams in accordance with Section 01781, “Operation and Maintenance Data.”

Fire Alarm and Mass Notification Systems; G

Fire alarm control panel
Fire alarm system field devices (all)
Mass Notification System field devices (all)

SD-11 Closeout Submittals

As-built drawings of each system; G

Fire Alarm Systems; G

As-built drawings of each system

After completion, but before final acceptance, submit a complete set of as-built drawings of each system to NAVFAC SOUTHEAST Fire Protection Engineer for use during final acceptance testing. Submit 600 x 900 mm (24 by 36 inch) drawings on paper with title block similar to full size contract drawings.

After completion submit six (6) complete sets of as-built drawings of each system to NAVFAC SOUTHEAST Fire Protection Engineer for record purposes. Submit 600 x 900 mm (24 by 36 inch) drawings on reproducible mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings as required by 01331N, "Design Submittal Procedures and 01332N, “Construction Submittal Procedures.”. For electronically prepared drawings, also provide a copy of drawing file on 3.5-inch floppy disk or CD-ROM in .dwg format.

D4010 SPRINKLERS

D401001 SPRINKLERS & RELEASING DEVICES

All components utilized must be Underwriters Laboratories listed or Factory Mutual approved for the intended use. Components shall be new, current, first quality products of the respective manufacturer. Manufacture shall provide parts and technical support for this product for a minimum of 15 years after installation. Coordinate work performed under this section with fire alarm system work performed under Section D50.

D401001 1.1 - DESCRIPTION

Design and provide automatic sprinkler systems for complete fire protection coverage throughout the buildings. Areas subject to freezing shall be provided with a dry pipe system.

D401001 1.2 – DESIGN CRITERIA

For light hazard areas the sprinkler rate of application shall be 4.1 $L/min/m^2$ (0.1 gpm/ft^2), over an area of 279 m^2 (3000 ft^2) with hose stream

allowance of 946 L/min (250 gpm). For ordinary hazard Group I areas the sprinkler rate of application shall be 6.1 L/min/m^2 (0.15 gpm/ft^2), over an area of 279 m^2 (3000 ft^2) with hose stream allowance of 1892 L/min (500 gpm). For ordinary hazard Group II areas the sprinkler rate of application shall be 8.1 L/min/m^2 (0.2 gpm/ft^2), over an area of 279 m^2 (3000 ft^2) with hose stream allowance of 1892 L/min (500 gpm). Hydraulic calculations shall include a minimum 0.69 bar (5 psi) or 10% (whichever is greater) safety factory (overage). Sprinkler system design shall include earthquake protection regardless of seismic zone.

D401001 1.3 – REQUIREMENTS

D401001 1.3.1 – Sprinklers

Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Locate sprinklers free of obstructions to spray pattern. Deflector shall not be more than 80 mm (3 inches) below suspended ceilings. Ceiling plates shall not be more than 15 mm (0.5 inches) deep. Ceiling cups shall not be permitted. Sprinklers that utilize o-ring sealed plungers are not acceptable.

a. Provide glass rod type quick-response recessed sprinklers with ordinary temperature rating in areas with finished ceilings. Provide white sprinklers and escutcheon plates.

b. Utilize quick response concealed sprinklers in all spaces with finished ceilings that contain electrical, electronic, and other water sensitive equipment.

c. Utilize brass upright sprinklers with ordinary temperature rating in unfinished areas (i.e., Mechanical Rooms, Electrical Rooms, Storage warehouses, etc.).

d. Utilize upright sprinklers with ordinary temperature rating and color to match finish in normally occupied rooms without a finished ceiling (i.e., laboratories, etc).

D401001 1.3.2 – Sprinkler Piping

a. Locate all piping so to eliminate risk of freeze damage. Do not run piping in attics unless located between ceiling and ceiling insulation system. No piping shall be exposed to exterior conditions. All piping in areas with finished ceilings shall be concealed.

b. Utilize steel piping. Make changes in pipe sizes with fittings that feature tapered reducing passageways. Sprinkler pipe and fittings shall be metal. Steel piping shall have a UL corrosion resistance ratio (CRR) of not less than 1.00. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings that use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be UL listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet or dry pipe sprinkler systems as appropriate. The same

manufacturer shall supply fittings, mechanical couplings, and rubber gaskets. Side outlet tees using rubber gasketed fittings shall not be permitted. Utilize internally hot dip galvanized pipe and fittings on dry pipe systems. Roll grooved fittings shall not be used with internally galvanized steel pipe.

c. For multistory buildings, each floor shall be zoned separately, each having a floor control valve assembly. The floor control valve assembly shall consist of a listed, supervised control valve, check valve, flow switch, and pressure guage. The floor control valve assembly shall be located in a rated stair enclosure.

D401001 1.3.3 – Field Painting

Clean surfaces prior to painting. Immediately after cleaning, prime metal surfaces with FS TT-P-664 or SSPC Paint 25 metal primer applied to a minimum dry film thickness of 1.5 mils. Exercise care to avoid painting sprinkler heads and operating devices. Upon completion of painting, remove materials that were used to protect sprinkler heads and operating devices that have been inadvertently painted and provide new clean sprinkler heads and operating devices of the proper type. Finish primed surfaces as follows:

a. Systems in Finished Areas

Finished areas are defined as areas where walls or ceilings are painted or are constructed of a pre-finished material. Paint primed surfaces with two coats of gloss red enamel. Paint valves and operating accessories with two coats of gloss red enamel.

b. Systems Above Suspended Ceilings

Provide piping with 2 inch wide red bands spaced at maximum 20 feet intervals throughout the piping system. Bands shall be gloss red enamel.

c. Systems in Unfinished Areas

Paint piping in valve rooms, mechanical rooms, with FS TT-E-489 gloss red enamel applied to a minimum dry film thickness of 1.6 mils.

D401001 1.3.4 – Penetrations

Thrust rod and sleeve all pipe penetrations of grade floor slab. Sleeve all penetrations of piping through walls and floors.

D401001 1.3.5 – Inspector’s Test Connection

Provide inspector test connection at most hydraulically remote section of system for each floor. Test valves as well as all auxiliary drain valves shall be located in accessible areas.

D401001 1.3.6 – Alarms

Connections to the building fire alarm system and electric alarm bell shall be made.

D401001 1.3.7 – Concrete Splash Blocks

Provide concrete splash blocks at all drain discharge points subject to high water velocities, such as the main drain and inspector test connection discharges.

D401001 1.3.8 – Elevators and Hoistways

Sprinklers shall have an intermediate temperature rating. Provide a dedicated branch-line with supervised control valve, check valve and flow switch serving the elevator machine room. Provide a listed excess pressure pump with relief valve across the check valve set to maintain a pressure of 30 psi greater than the maximum anticipated system pressure. Provide a sign for the control valve stating "ELEVATOR SPRINKLER ISOLATION VALVE". If sprinklers are provided in the elevator hoistway, sprinklers at the same level as the associated machine room may be fed from the dedicated branch-line serving that machine room. Sprinklers serving the hoistway that are at a difference level than the elevator machine room shall have a dedicated branch-line with supervised control valve, check valve and flow switch independent from that machine room branch-line. Provide a test connection with drain to facilitate testing of flow switch. Test connection shall be piped to building exterior. Provide a sign at the test connection stating "ELEVATOR POWER SHUTDOWN TEST CONNECTION". Flow switch shall be set no retard action. Modifications to these criteria to meet local and state code requirements are acceptable upon consultation with the Southern Division FPE.

D401001 1.4 – DRY SPRINKLER EQUIPMENT

D401001 1.4.1 – Low Air Pressure Supervisory Switch

Provide switch for each sprinkler system and connect to building fire alarm system to activate the system supervisory alarm when air pressure in system drops halfway from the normal pressure to the tripping point. Provide a bleeder valve in the air line ahead of the switch for testing operation of the switch. The valve shall be normally open. Closing the valve shall shut off the air supply to the switch and exhaust the pressure between the switch and valve.

D401001 1.4.2 – Tank Mounted Air Compressor

Provide an approved, automatic type, electric motor-driven air compressor including pressure switch, air piping, and 10 gallon minimum capacity tank. Compressor shall have a minimum capacity capable of charging the complete sprinkler system to normal system air pressure within 30 minutes. Minimum rated run life of the compressor shall be 4000 hours. Provide an approved automatic air maintenance device for each system. Direct drive and “oil-less” air compressors are not acceptable.

D401002 SPRINKLER WATER SUPPLY EQUIPMENT AND PIPING

D401002 1.1 – DESCRIPTION

Provide piping meeting the requirements of this section for the fire protection system. Systems shall be provided with zoned control valve

assembly. The sprinkler system shall be zoned per floor with 1 zone per floor. The main control valve for incoming service shall be an OS&Y valve or a PIV.

D401002 1.2 – WATER SUPPLY DATA

Base hydraulic calculations on a static pressure of 68 psig with 1025 gpm available at a residual pressure of 56 psig at the junction with the water distribution piping system.

D401002 1.3 – WATER SERVICE

D401002 1.3.1 – Below Ground Piping:

a. Minimum lead in size shall be 150mm (6 inches).

b. Regardless of trade installing the underground lead-in, provide a post indicator control valve on this supply line. Provide a means of monitoring valve in open position via padlock.

c. Provide fire hydrants as required by NFPA 24.

D401002 1.3.2 – Backflow Preventer

Backflow preventer shall be listed for vertical installation if installed vertically. Pipe test connection for the backflow prevention device to an adequately sized floor drain or to the exterior of the building. Attach field test reports to valve and in accordance with any applicable local requirements. Submit copy of test report to Contracting Officer prior to final acceptance. Devices shall have been approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California for intended applications.

D401002 1.3.3 – Fire Department Connection

Provide a fire department connection for each building. Provide connections approximately one meter (3 feet) above finish grade with 65 mm (2-1/2 inch) National Standard female hose threads with plug, chain and identifying fire department connection escutcheon plate.

D4030 FIRE PROTECTION SPECIALTIES

D403001 FIRE EXTINGUISHING DEVICES

D403001 1.1 – DESCRIPTION

Provide portable fire extinguishers in accordance with NFPA 101. Locate and install in accordance with NFPA 10.

Exception: For Industrial and Storage occupancies provide and install extinguishers in accordance with NFPA 10.

D403001 1.2 – REQUIREMENTS

a. All fire extinguishers shall be located in recessed cabinets in finished spaces. Recessed cabinets located in fire rated walls, shall

be listed or approved fire rated cabinets that can be installed in fire rated walls without having to “build out” the wall.

b. Fire extinguishers located in industrial spaces, Mechanical Rooms, Electrical Rooms, and Laboratories may be located in surface mounted cabinets provided they do not interfere with exiting or operations of that space.

c. Provide fire extinguishers of the following ratings:

1. One 4.5 kg (10 pound) tri-class unit in each mechanical, electrical, and storage rooms.

2. One 4.5 kg (10 pound) tri-class unit in all finished areas.

D5030 COMMUNICATIONS AND SECURITY

D503001 FIRE ALARM SYSTEMS

D503001 1.1 - DESIGN REQUIREMENTS

Provide an evacuation and a detection system in full compliance with the required and advisory portions of NFPA 72 National Fire Alarm Code, the UL listings or Factory Mutual approvals, the ADA, and the recommendations of the equipment manufacturer, UFC 3-600-01, and UFC 3-600-10N, except as modified herein.

D503001 1.1.1 - Coverage

Systems shall monitor all initiating circuits, indicating circuits and supervisory circuits including those for valve tamper switches. Each device shall have a unique address. Activation of any manual station, smoke detector, heat detector or sprinkler system flow switch shall cause:

Building alarm devices to sound.
Actuation of the station fire alarm reporting system.

Activation of any valve tamper switch shall initiate a dedicated sprinkler supervisory signal per NFPA 72.

D503001 1.2 - MAIN PANEL

Fire alarm system shall be fully addressable with 80 character programmable alphanumeric displays, capable of handling a minimum of 500 individually identified sensors within the main control panel. Panel shall be modular type installed in steel cabinet with hinged door and cylinder lock. Panel shall be a factory-wired assembly containing components and equipment necessary to perform specified operating and supervisory junctions of the system. Provide each fire alarm control panel with a fan shutdown bypass switch. When operated, the switch will bypass the automatic fan shutdown capabilities of each zone. Operation of the switch shall cause the operation of the system trouble signal. Use of signaling circuit power extender panels is prohibited. Integral rechargeable set shall be sized for 60 hours minimum of standby service followed by 30 minutes of alarm service. The main panel shall be located

as directed by the Contracting Officer in conjunction with the NAVFAC SOUTHEAST Fire Protection Engineer and Base Fire Inspector.

D503001 1.2.1 – Remote Annunciator

Provide a remote annunciator that has an 80 character alphanumeric display with Alarm acknowledge, and alarm silence. The remote annunciator shall be located as directed by the Contracting Officer in conjunction with the NAVFAC SOUTHEAST Fire Protection Engineer and [Base] Chief Fire Inspector.

D503001 1.2.2 - Wiring

All wiring shall be in metallic conduit. Conceal conduit in finished areas. Pigtail or "T" tap connections are not permitted. Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit shall not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide Class A Style Z Notification Appliance Circuits, Class B Style 4 Signaling Line Circuits, and Class A Style D Initiation Device Circuits. All AC power circuits shall utilize minimum 12 AWG wire, notification appliances circuits shall utilize minimum 14 AWG wire, non-powered addressable devices may use 18 AWG and everything else shall be minimum 16 AWG.

D503001 1.2.2.1 - Dielectric Strength and Insulation Resistance

Test the dielectric strength and the insulation resistance of the system interconnecting wiring by means of an instrument capable of generating 500 volts dc and equipped to indicate leakage current in 1000 megohms. For the purpose of this test, the instrument shall be connected between each conductor on the line and between each conductor and ground at the control panel end of the line, with the other extremity open circuited, prior to connection of system field devices. The system shall withstand the test without breakdown and shall indicate a resistance of not less than 500,000 ohms, the measurement being taken after an electrification of not more than 1.0 minute with a dc potential of not less than 100 volts not more than 550 volts. When tests have been completed and corrections made submit a signed and dated certificate to the Contracting Officer prior to installation of system field devices.

D503001 1.3 - TRANSMITTED SIGNALS

Provide a minimum 16 zone radio transmitter for each system for automatic transmission of signals to the fire department. Radio transmitter shall be manufactured by MONACO. Transmitter shall be factory assembled and tested complete with manufacturer's locking cabinet, 60 hour rechargeable battery set, automatic battery charger, omni-directional antenna with

mounting system, antenna surge arrestor, and coaxial cable. Installation shall be in strict accordance with the manufacturer's recommended practices, product listing or approvals, and NFPA 70, NFPA 72, and NFPA 1221. Ground transmitter and antenna to a driven ground rod and the facility electrical ground system. Supply power to transmitter through a line voltage surge arrestor from the fire alarm circuit. Transmitter frequency and identity shall be as directed by the Contracting Officer.

Notwithstanding any other provisions of this contract, no other product will be accepted.

Provide the following signals to be sent to the fire alarm receiving station via the MONACO radio transmitter:

a. Sprinkler Water Flow

b. Smoke Detector

c. Manual Pull Station

d. Supervisory (i.e., valve tamper switch, pressure switch, etc.)

e. Duct Smoke Detector

f. Spare

D503001 1.4 - SEQUENCE OF OPERATION

The fire alarm sequence of operation shall be as provided in matrix format similar to the one shown in Appendix F of UFC 3-600-10N.

D503001 1.5 - MANUAL STATIONS

Provide addressable at each stairwell entrance on every floor and at every exterior man door for all spaces. Keys shall match that of the fire alarm panel cabinet. Manual pull stations shall be flush. Manual stations located on building exterior or covered walkways shall be NEMA 3 rated or enclosed in a cast fire alarm station enclosure with side - hinged door.

D503001 1.6 - AUDIBLE-VISUAL DEVICES

Provide speakers so that minimum of 75 dB is provided through out the building. Intelligibility requirements can be found in the appendix of NFPA 72. These requirements shall be met. Provide strobes that comply with NFPA 72 and the ADA. Locate strobes in accordance with NFPA 72. Visual devices shall be synchronized when more than one device is located in a common field of view. Devices shall **not** say “FIRE.”

D503001 1.7 - VOICE EVACUATION SYSTEMS

Provide a voice annunciation type fire alarm and evacuation system in full compliance with the mandatory and advisory portions of NFPA 72 and 101.

The voice evacuation message shall feature a synthesized female voice type message that is stored on a double e-prom chip and shall state the following:

“May I have your attention please? May I have your attention please? A fire emergency has been reported in the building. Please leave the building by the nearest exit or exit stairway. Do not use the elevators.” <Provide a 2 second pause> “May I have your attention please...”(repeat the message).

System shall provide a spare power amplifier and automatic switching circuitry that will substitute the redundant amplifier for a failed unit. Amplifier circuits shall be loaded to no more than 70% of rated continuous capacity when producing sound levels as required by NFPA 72 against normal ambient background noise levels for this occupancy. Speaker strobes shall be multiple tap units tapped no higher than the second from the highest tap. Provide manual over ride (public address mode) operation via a microphone at the control panel, and a second command center located as directed by the Contracting Officer.

D503001 1.8 - SPOT SMOKE DETECTION

Provide addressable photoelectric type on ceilings of all spaces containing electrical and electronic equipment, under any raised floor systems, and in other areas as required by code or UFC 3-600-10N. Detectors shall be laid out in a symmetrical fashion and centered throughout the space. Detectors shall have twist lock base with wiring connections made in the base. "Baseless" smoke detectors are not acceptable. Provide detector manufacturer's protective wire guard over each device, secure with tamper proof mechanical fasteners when located in areas subject to tampering. Detectors shall remain covered until beneficial occupancy to prevent contamination with construction dust and debris.

D503001 1.9 - DUCT TYPE SMOKE DETECTION

Provide photoelectric type in all air-handling units as required by NFPA 90A. Activation of any duct smoke detector shall cause shut down of all air handler units in the associated floor or zone. Duct detector shall utilize sampling tubes that extend the width of the duct. Provide manometer testing of all housings to demonstrate satisfactory airflow.

D503001 1.10 - LINE VOLTAGE SURGE SUPPRESSION

Provide line voltage surge arresters to suppress all voltage transients that might damage fire alarm panel/transmitter components. Unit shall wire in series with the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330-volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction that includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) that extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

D503001 1.11 - LOW VOLTAGE SURGE SUPPRESSION

Provide low voltage surge arresters to suppress all voltage transients on initiating, signaling, transmitter tripping, and auxiliary control circuits. Unit shall wire in series with the protected equipment with screw terminations. Provide protection for all circuits that leave the building shell. When circuits interconnect two or more buildings provide an arrester at the conductor entrance to each building.

Unit(s) shall be UL 497B listed with a 30 volt-clamping level and have a maximum response time of 5 nanoseconds. Device shall feature multi stage construction and both differential/common mode protection. Install units in strict accordance with the manufacturer's recommendations. Provide detailed manufacturer's submittal data demonstrating compliance with all the above listed requirements.

D503001 1.12 - LOCAL SPRINKLER WATER FLOW ALARM BELL

Provide a 25.4 cm (10 inch) diameter weatherproof rated bell and backbox for local annunciation of sprinkler water flow conditions in accordance with NFPA 13. Bell shall be powered and supervised by the fire alarm panel and shall sound continuously upon activation of the main sprinkler system riser flow switch. Alarm panel signal silence and reset functions shall not affect bell operation until water flow switch has reset to normal position. Locate bell on the exterior building wall approximately 2.4 meters (8 feet) above grade adjacent to main sprinkler riser unless otherwise directed by the Contracting Officer.

D503001 1.13 - SPARE PARTS

Spare Parts: Spare parts shall be directly interchangeable with the corresponding components of the installed system. Spare parts shall be suitably packaged and identified by nameplate, stamping or tagging. Furnish the following:

1. Four keys or tools for resetting manual stations
2. Four keys for locks of control panels or cabinets
3. Two of each type smoke sensors with bases
4. Two of each type control module (if applicable)
5. Two of each type of monitor module (if applicable)
6. Three fuses of each type provided. Spare fuses shall be mounted in fuse-holder located inside each control panel
7. One of each type audio/visual device
8. One of each type visual device
9. Two boxes (min. 200 sheets per box) of printer paper
10. Five printer ribbons

--End of Section--

SECTION D50

ELECTRICAL
07/04

D50 GENERAL

D50 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

Provide an interior electrical system consisting of Service Entrance Wiring and Equipment, Distribution and Lighting Panelboards, Dry Type Transformers, Conduits, Feeder and Branch Circuits, Motor Control Equipment, Lighting and Branch Wiring, Communications, Security and Alarm Systems, Emergency Generator, Emergency Lighting and Power, Grounding, Lightning Protection, 400-Hertz Converters and UPS including accessories and devices as necessary and required for a complete and usable system.

This section covers installations inside the facility and out to the five foot line. See Section G40 “Site Electrical” for continuation of systems beyond the five-foot line.

This is a general section. Not all items in this section will be required for this project. See Project Program section ESR D50 for project specific requirements.

D50 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award.

D50 1.2.1 - Industry Codes and Standards

Adhere to applicable Industry Codes and Standards.

D50 1.2.2 - Government Publications

IA PUB-5239-22 “Information Assurance Protected Distribution System (PDS) Guidebook – FOR OFFICIAL USE ONLY”

UNITED FACILITIES CRITERIA (UFC)

UFC 1-200-01 “Design: General Building Requirements”

UFC 3-501-03N "Electrical Engineering Preliminary Design Considerations"

UFC 3-530-01 "Interior and Exterior Lighting and Controls"

UFC 3-580-10 "Design: Navy and Marine Corps Intranet (NMCI) Standard Construction Practices"

UFC 3-600-01 "Design: Fire Protection Engineering for Facilities"

UFC 3-600-10N "Design: General Fire Protection Requirements"

UFC 4-010-01 "DoD Minimum Antiterrorism Standard for Buildings"

UFC 4-021-01 "Design and O & M: Mass Notification Systems (MNS)"

UNITED FACILITES GUIDE SPECIFICATIONS (UFGS)

UFGS 28 16 00.00 20, "Basic Intrusion Detection Systems (IDS)"

UFGS 28 20 00.00 20, "Electronic Security Systems (ESS), Commercial"

UFGS 26 32 13.00 20, "Single Operation Generator Sets"

UFGS 26 29 23, "Variable Frequency Drive Systems Under 600 Volts"

UFGS 26 36 23.00 20, "Automatic Transfer Switches"

UFGS 26 23 00, "Switchboards and Switchgear"

D50 1.3 - SYSTEM DESCRIPTION

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, "Design: General Building Requirements"
UFC 1-300-09N, "Design Procedures"
UFC 3-501-03N, "Electrical Engineering Preliminary Design Considerations"
UFC 3-530-01, "Interior and Exterior Lighting and Controls"
UFC 3-580-10, "Design: Navy and Marine Corps Intranet (NMCI) Standard Construction Practices"
UFC 3-600-01, "Fire Protection Engineering For Facilities"
UFC 3-600-10N, "Design: General Fire Protection Requirements"
UFC 3-800-10N, "Design: General Environmental Requirements"
UFC 4-010-01, "DoD Minimum Antiterrorism Standard for Buildings"
UFC 4-021-01, "Design and O & M: Mass Notification Systems (MNS)"
IA PUB-5239-22, "Information Assurance Protected Distribution System (PDS) Guidebook – **FOR OFFICIAL USE ONLY**"

D50 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

Qualifications, Training Plans, and Test Plans and Procedures indicated herein, shall be submitted 45 calendar days prior to the expected date of execution. Notify the Contracting Officer 14 calendar days prior to all testing. Submit test results within 7 calendar days of completion of testing.

D50 1.4.1 - Qualified Workers

Use qualified workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.

D50 1.4.1.1 - Qualified Testing Organization

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor.

a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.

b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

D50 1.4.1.2 - NEC Qualified Worker

In accordance with NFPA 70, Qualified Workers shall be allowed to be assisted by helpers on a 1 to 1 ratio, provided such helpers are registered in recognized apprenticeship programs.

D50 1.4.1.3 - Qualified Telecommunications Worker

All installers assigned to the installation of telecommunications systems or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installation Technicians or have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components. Include names and locations of two projects successfully

completed using optical fiber and copper communications cabling systems. Include written certification from users that systems have performed satisfactorily for not less than 18 months. Include specific experience in installing and testing structured telecommunications distribution systems using optical fiber and Category 5e cabling systems.

D50 1.4.1.4 - Qualified Fire Protection Engineer

The design/build contractor shall have a firm contractual agreement with a Qualified Fire Protection Engineer (DBFPE). The contractor shall provide a copy of the agreement to the government at the time of the Pre-Construction meeting. The DBFPE shall be an integral part of the design team and shall be involved in every aspect of the design as it relates to fire protection, which includes, but is not limited to, building code analysis, life safety code analysis, design of automatic detection and suppression systems, water supply analysis, and a multi-discipline review of the entire project. The DBFPE can be used as a technical representative for any of the equipment manufacturers during system testing. The DBFPE shall review all fire protection submittals and certify in writing that the design is in compliance with all applicable codes.

D50 1.4.1.5 - Instructor’s Qualifications for Electronic Security Systems ESS

Prior to installation, submit data of the installer’s experience and certified qualifications. Show that the installer who will perform the work has a minimum of 3 years experience successfully installing ESS of the same type and design as specified herein. Include the names, locations, and points of contact of at least two installations of the same type and design as specified herein where the installer has installed such systems. Indicate the type of each system and certify that each system has performed satisfactorily in the manner intended for a period of not less than 12 months.

D50 1.4.2 - Material Standards

Materials, equipment, fixtures, and other appurtenances shall comply with applicable Underwriters Laboratories, (UL) Inc., American National Standards Institute, Inc., and National Electrical Manufacturer’s Association standards or applicable standards of a similar independent testing organization. All materials shall be new, and shall bear the label of Underwriters Laboratories whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer’s recommendations.

D50 1.4.2.1 - Service Support

The equipment items shall be supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

D50 1.4.2.2 - Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place, the nameplate of the distributing agent will not be acceptable.

D50 1.4.3 - Factory Testing

The Government reserves the right to witness all factory testing. The manufacturer shall have a calibration program that assures that all applicable test instruments are maintained within rated accuracy.

D50 1.4.4 - Electrical System Startup and Testing

Design submittal specifications shall include testing and training recommendations for government approval. Those recommendations shall be tailored to the systems provided. The test plan shall list make and model and provide functional description of the test instruments and accessories and shall describe the setup of the tests to be conducted. Provide test instruments capable of measuring and recording or displaying test data at a higher resolution and greater accuracy than specified for the equipment’s performance.

D50 1.4.4.1 - Factory Trained Engineer

Provide a factory trained engineer to supervise start-up and testing for Diesel-Electric Generator Sets, Secondary Switchgear, Automatic Transfer Switches, Lighting Control Systems, Uninterruptible Power Supplies, 400-Hertz Motor Generator Sets, 400-Hertz Solid State Frequency Converters, and Variable Frequency Drives.

D50 1.4.5 - Performance Verification Testing

The Government reserves the right to witness all Performance Verification Tests, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements. The Contractor shall show by demonstration in service that all circuits and devices are in operating condition. Tests shall be such that each item of control equipment will function not less than five times. The Contractor shall provide all necessary test equipment, tools, fuel, load banks, etc., labor, and materials for testing. As a minimum, all systems shall be tested in accordance with manufacturer’s recommendations. Additional testing requirements for the various systems are described with those systems, hereinafter. The Contractor shall assure that all applicable test instruments are maintained within rated accuracy. Dated calibration labels shall be visible on all test equipment.

Submit a separate electrical field test plan in accordance with manufacturer’s recommendations and that conforms to NETA ATS for each piece of Electrical Distribution Equipment and/or System requiring Performance Verification Testing.

The DBFPE shall witness all preliminary and final acceptance tests of all systems. Contractor shall perform complete functional preliminary

tests of all systems to assure operable status before requesting the final acceptance tests. Preliminary tests shall include ground resistance testing, dielectric strength and insulation resistance testing, smoke detector sensitivity testing, manometer testing of all duct smoke detector housings and operational testing of all system control features. Smoke detector sensitivity tests shall be conducted and recorded. When tests have been completed and corrections made, submit a signed and dated certificate with a request for formal inspection and tests at least 15 days prior to inspection date. Final acceptance tests shall be conducted in the presence of the [insert cognizant EFD/A] FPE and Contracting Officer field representative only after all discrepancies discovered during the preliminary testing have been rectified. All systems shall be operated to demonstrate compliance with contract requirements and respective NFPA codes. Test procedures shall be in full compliance with the respective NFPA codes, the equipment manufacturer recommendations, and UFC 3-600-10N. Complete functional testing of the fire alarm system includes but is not limited to wiring supervision, detector sensitivity, manometer testing and sound level measurement. Provide all personnel, equipment, and materials for tests. The systems manufacturer technical representative shall be present for the final inspection and test. Make any changes in panel software as directed during the tests. The DBFPE shall prepare a written report detailing compliance of any outstanding submittal review comments, summarizing the results of all tests, detailing all discrepancies discovered, corrective action taken, all forms as required by the respective NFPA codes, and recommendations/ certifications for acceptance. Forward one copy of the report with attachments to NAVFAC Southeast Fire Protection Engineer and Chief Fire Inspector. Beneficial occupancy of the facility cannot occur until all fire protection systems have been accepted.

D50 1.4.6 - Acceptance Tests and Inspections

The Government reserves the right to witness all Acceptance Tests and Inspections, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements.

The Qualified Testing Organization shall provide the Acceptance Tests and Inspections test plan and perform the acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Perform acceptance tests and inspections on Diesel-Electric Generators, 400-Hertz Motor Generator Sets, 400-Hertz Solid State Frequency Converters, Automatic Transfer Switches, and Switchgear.

D50 1.4.7 - Training

After installation of the equipment and systems, provide individual training courses for two Government personnel for each of the items listed below, covering items contained in the Operations and Maintenance manuals. Provide a VHS format videocassette and a DVD diskette of the training courses to be used as refresher courses and to train additional personnel. The same factory trained engineer that supervised the installation of the system shall conduct training. Training shall include classroom discussion as well as hands on maintenance, replacement of typical components and repair type maintenance training for parts typically replaced or repaired in the field. Training plan shall include scheduling, content, outline, and training material handouts. Provide training for the following:

a. Diesel-Electric Generator Sets— 16 hours

b. Automatic Transfer Switches — 16 hours

c. Lighting Control Systems — 16 hours

d. Uninterruptible Power Supply — 16 hours

e. Variable Frequency Drives – 16 hours

f. Fire Alarm Systems as follows:

- The contractor shall provide training for the active systems within 6 weeks of final acceptance of the systems.
- Equipment manufacturer shall provide four days of technical training to the Government on site. Training shall allow for classroom instruction as well as individual hands on programming, trouble-shooting and diagnostics exercises.

g. Electronic Security Systems as follows:

- The Contractor shall provide a minimum of 8 hours administrator training. Training shall include configuration of the following: a) cardholder/user data, b) alarm zones, c) time zones, d) report generation, e) alarm masking/acknowledging, f) minor trouble shooting, and g) other day to day administrative requirements.
- The Contractor shall provide a minimum of 8 hours operator training shall include: a) alarm masking/acknowledging, b) report generation, c) alarm assessment, d) log on/off, and e) other day to day monitoring requirements.

h. Access Control Systems as follows:

- The Contractor shall provide 4 hours user training. Training shall include how to access a facility and/or site using card, keypad and or Biometric Identification Technologies.

D50 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section

01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory electrical system performance shall be via “Performance Verification Testing” and “Acceptance Tests and Inspections”, as detailed in this section of the RFP.

D50 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures”, UFC 1-300-09N, “Design Procedures”, UFC 3-500-10N, “Design: General Electrical Requirements” and UFC 3-600-10N, “Design: General Fire Protection Requirements”.

D50 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

D50 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Panelboards; G

Dry Type Transformers; G

Motor Controllers and Centers; G

Data Transmission Media; G

Closed Circuit Television System; G

Automated Access Control System; G

Intrusion Detection System; G

Telecommunications System; G

CATV Systems

Public Address System; G

Lightning Protection System; G

Provide scaled Fire Protection drawings a minimum size 600 x 900 mm (24 x 36 inches). Scale of drawings shall be large enough to be legible and clear. Sealing of drawings, if required, shall be the responsibility of the DBFPE.

Fire Alarm System Plans

Provide detail-working drawings of system layout that include the following:

1. Fire detection and alarm layout plans showing the location of fire alarm control panels, all fire alarm system initiating and indicating devices, monitor and control modules, relays, door closures. On the floor plans, show conduit routing, circuit identification, wire counts, extender panels, etc. Provide the notification appliance circuit maximum output vs. actual load.

2. Fire alarm riser diagrams showing hierarchy, arrangement and interlocks necessary for associated controls. Provide a schedule of signals to be transmitted to the base receiving station. A sequence of operation shall be submitted with the fire alarm submittal in a matrix format.

SD-03 Product Data

Devices; G

Dry Type Transformers; G

Motor Controllers and Centers; G

Panelboards and Circuit Breakers; G

TVSS; G

CATV Systems; G

Public Address Systems; G

Lighting Systems; G

Telecommunications System; G

Fire Protection System as follows:

Control panel and all integral components; G
Manual pull stations; G
Smoke detectors; G
Audio/visual devices; G
Line voltage surge suppressors; G
Local sprinkler water flow alarm bell; G
Heat detectors; G
Remote annunciator; G
Radio transmitter; G

Electronic Security Systems (ESS) as follows:

Data Transmission Media; G
Close Circuit Television System; G
Automatic Access Control System; G
Intrusion Detection System; G

SD-05 Design Data

Fire Protection; G

Provide standby battery calculations. The calculations shall be based on the maximum output of each circuit or module provided. Show the individual notification appliance circuit loading calculations.

Electronic Security System (ESS); G

Provide standby battery calculations. The calculations shall be based on the maximum output of each circuit provided.

SD-06 Test Reports

Performance Verification Test Reports; G

Acceptance Tests and Inspections Reports; G

Preliminary Test Reports On Fire Alarm Systems; G

Performance Verification Test Reports on Electronic Security System (ESS)

SD-07 Certificates

Selective Coordination Study; G

Training Plan; G

Performance Verification Test Plan and Procedures; G

Qualifications of Testing Organization and Engineering Technician; G

Acceptance Tests and Inspections Procedure; G

Worker Qualifications; G

Fire alarm system Certificate of Completion; G

SD-08 Manufacturer's Instructions

CATV Connector Installation Instructions; G

SD-09 Manufacturer’s Field Reports

Dry Type Transformers Factory Tests; G

Fiber Optic Cable Factory Reel Tests; G

SD-10 Operation and Maintenance Data

Submit Data Package in accordance with Section 01781 “Operation and Maintenance Data”.

Intercommunication System, Data Package 5; G

Telecommunication System Cabling and Pathway, Data Package 5; G

Lighting Control System, Data Package 5; G

Fire Alarm Systems; G

Fire alarm control panel
Fire alarm system field devices (all)

Electronic Security Systems (ESS) G

Data Transmission Media
Close Circuit Television System
Automatic Access Control System
Intrusion Detection System
Security Operations Center

SD-11 Closeout Submittals

Assembled Operation and Maintenance Manuals; G

Electronic Ballast Warranty Information; G

Lightning Protection System Master Label; G

Fire Alarm Systems; G

Posted operating instructions for fire pump components

As-built drawings of each system

1. After completion, but before final acceptance, submit a complete set of as-built drawings of each system to NAVFAC Southeast Fire Protection Engineer for use during final acceptance testing. Submit 841 x 594 mm (24 by 36 inch) drawings on paper with title block similar to full size contract drawings.

2. After completion submit six (6) complete sets of as-built drawings of each system to NAVFAC Southeast Fire Protection Engineer for record purposes. Submit 841 x 594 mm (24 by 36 inch) drawings on reproducible mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings. For electronically prepared drawings, also provide a copy of drawing file on CD-ROM in .dxf format.

Electronic Security System (ESS) G

Posted operating instructions for ESS components

As-built drawings of each system

1. After completion, but before final acceptance, submit a complete set of as-built drawings of each system to NAVFAC Southeast Fire Protection Engineer for use during final acceptance testing. Submit 841 x 594 mm (24 by 36 inch) drawings on paper with title block similar to full size contract drawings.

2. After completion submit six (6) complete sets of as-built drawings of each system to NAVFAC Southeast Fire Protection Engineer for record purposes. Submit 841 x 594 mm (24 by 36 inch) drawings on reproducible mylar film with title block similar to full size contract drawings. Furnish the as-built (record) working drawings in addition to as-built contract drawings. For electronically prepared drawings, also provide a copy of drawing file on CD-ROM in .dxf format.

D5010 ELECTRICAL SERVICE AND DISTRIBUTION

The Designer of Record in accordance with UFC 3-520-01 shall determine electrical characteristics.

All service and feeder circuits shall be installed in conduit. Conduit shall be metallic above the first floor slab. Schedule 40 PVC may be used below the first floor slab. Use of Type AC, MC or MI cable assemblies is not permitted.

D501001 MAIN TRANSFORMERS

Pad mounted transformers shall be in accordance with Section G40 “Site Electrical Utilities”.

D501002 SECONDARY

The secondary distribution system shall be in accordance with UFC 3-500-10N. Provide TVSS in accordance with UFC 3-500-10N. TVSS equipment shall comply with UL 1449 and UL 1283, and designed, manufactured, tested and installed in compliance with IEEE C62.41, IEEE C62.45, NFPA 70, NFPA 75, and NFPA 780.

D501003 SERVICE ENTRANCE EQUIPMENT

Service entrance equipment shall consist of Switchgear, Switchboards or Panelboards in accordance with UFC 3-500-10N. When a switchboard or switchgear is required, the Designer of Record shall utilize UFGS Specification Section 26 23 00 “Switchboards and Switchgear” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

D501004 INTERIOR DISTRIBUTION TRANSFORMERS

Provide dry type transformers as required and in accordance with UFC 3-500-10N. Transformers shall comply with NEMA ST 20. Transformers for Non-

linear loads shall comply with ANSI/IEEE C57.110 and have K-Ratings to meet system requirements.

D501004 1.1 - PERFORMANCE VERIFICATION TEST

Perform the standard tests in accordance with the Inspection and Test Procedures for transformers, dry type, air-cooled, 600 volt and below, as specified in NETA ATS.

D501004 1.2 - TRANSFORMER FACTORY TEST

NEMA ST 20 transformer test results on each transformer and also results of NEMA "design" and "prototype" tests that were made on transformers electrically and mechanically equal to those specified.

D501005 PANELS

Provide panelboards in accordance with UFC 3-500-10N. Panelboards shall comply with UL 67 and UL 50 and circuit breakers with UL 489. UL 869A shall apply if used as service entrance equipment. Panelboards for non-linear loads shall be UL listed and heat rise tested in accordance with UL 67, except with the neutral assembly installed and carrying 200 percent of the phase bus current during testing. Ground fault Circuit Interrupting circuit breakers shall comply with UL 943. Arc fault circuit breakers shall comply with UL 489 and UL 1699.

D501005 1.1 - PERFORMANCE VERIFICATION TEST

Test each GFI and or AFI circuit breaker to verify correct operation.

D501006 ENCLOSED CIRCUIT BREAKERS

UL 489. UL 869A shall apply if used as service entrance equipment. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as required. Provide with solid neutral when grounded conductor is present.

D501007 MOTOR CONTROL CENTERS

Contractor shall coordinate all motor control requirements with applicable sections of this RFP to ensure proper connections and control of equipment. Controllers shall be in accordance with UFC 3-500-10N.

D501007 1.1 - VARIABLE FREQUENCY DRIVES (VFD)

When Variable Frequency Drives are required, the Designer of Record shall utilize UFGS Specification Section 26 29 23 “Variable Frequency Drive Systems Under 600 Volts” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

D501007 1.2 - PERFORMANCE VERIFICATION TESTS

Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time. Coordinate testing

for automatic operation of motor controllers with the applicable section included in this RFP.

D5020 LIGHTING AND BRANCH WIRING

D502001 BRANCH WIRING

General purpose receptacles and branch circuit wiring and devices including lighting equipment shall be in accordance with UFC 3-500-10N. Provide wiring and connections for special outlets where required.

All wiring shall be in metallic conduit above the first floor slab. Schedule 40 PVC may be used below the first floor slab. Use of type NM cable is limited to dwelling unit occupancies with wood structures of 2 floors or less. Use of Type AC, MC or MI cable assemblies is not permitted.

All circuiting including homeruns shall be shown on the design drawings exactly as they are to be installed. Homeruns shall contain no more than 3 phase conductors.

D502001 1.1 - PERFORMANCE VERIFICATION TEST

Test GFI receptacles for proper operation.

D502002 LIGHTING EQUIPMENT

Lighting systems shall be in accordance with UFC 3-500-10N. Installation shall meet requirements of NFPA 70, manufacturer’s recommendations and the additional requirements for “Severe Seismic Disturbance” contained in ASTM E 580. Fixture support wires shall conform with ASTM A 641/A 641M, galvanized regular coating, soft temper.

No wraparound fluorescent fixtures are permitted. Refractor style wall packs shall be limited to service areas of buildings. Exterior fixtures shall have no horizontal or higher light components.

D502002 1.1 - BALLASTS

Electronic ballast shall include a 5-year warranty.

D502002 1.2 - PERFORMANCE VERIFICATION TESTS

Aim photocell switches and locate light level sensors in accordance with the manufacturer's recommendations. Verify that equipment operates in accordance with user’s requirements and in accordance with manufacturer’s recommendations. Contractor’s Quality Control (CQC) representative shall perform a field survey of the lighting system in accordance with IESNA and provide footcandle measurements for each space to verify lighting levels are in accordance with design requirements. Designer of Record shall provide a copy of initial calculations to verify values are in compliance. Fluorescent lamps on electronic dimming ballast control shall be burned in at full light output for 100 hours before dimming.

D5030 COMMUNICATIONS AND SECURITY

D503001 FIRE ALARM SYSTEMS

D503001 1.1 - DESIGN REQUIREMENTS

Provide an evacuation and a detection system in full compliance with the required and advisory portions of NFPA 72 National Fire Alarm Code, the UL listings or Factory Mutual approvals, the ADA, and the recommendations of the equipment manufacturer, UFC 3-600-01, and UFC 3-600-10N, except as modified herein.

D503001 1.2 - MAIN PANEL

The FACP shall be capable of handling a minimum of 500 individually identified sensors within the main control panel. Provide Class A, Style Z Notification Appliance Circuits, Class B, Style 4 Signaling Line Circuits, and Class A, Style D Initiation Device Circuits. The main panel shall be located as directed by the Contracting Officer in conjunction with the NAVFAC Southeast Fire Protection Engineer and Chief Fire Inspector.

D503001 1.2.1 - Remote Annunciator

Provide a remote annunciator that has an 80 character alphanumeric display with Alarm acknowledge, alarm silence, and reset functions. The remote annunciator shall be located as directed by the Contracting Officer in conjunction with the NAVFAC Southeast Fire Protection Engineer and Chief Fire Inspector.

D503001 1.3 - TRANSMITTED SIGNALS

Provide the following signals to be sent to the fire alarm receiving station via the MONACO radio transmitter:

a. Sprinkler Water Flow

b. Smoke Detector

c. Manual Pull Station

d. Supervisory (i.e., valve tamper switch, pressure switch, etc.)

e. Duct Smoke Detector

f. Spare

D503001 1.4 - SEQUENCE OF OPERATION

The fire alarm sequence of operation shall be provided in matrix format similar to the one shown in Appendix F of UFC 3-600-10N.

D503001 1.5 - MANUAL STATIONS

Manual pull stations shall be flush.

D503001 1.6 - AUDIBLE-VISUAL DEVICES

Provide speakers so that minimum of 75 dB is provided through out the building. Provide strobes that comply with NFPA 72 and the ADA. Locate

strobes in accordance with NFPA 72. Visual devices shall be synchronized when more than one device is located in a common field of view.

D503001 1.7 - VOICE EVACUATION SYSTEMS

The voice evacuation message shall be a female voice, shall meet the voice intelligibility requirements of NFPA 72 and shall state the following:

"May I have your attention please? May I have your attention please? A fire emergency has been reported in the building. Please leave the building by the nearest exit or exit stairway. Do not use the elevators. <Provide a 2 second pause> May I have your attention please...(repeat the message)".

D503001 1.8 - SPARE PARTS

Spare Parts: Spare parts shall be directly interchangeable with the corresponding components of the installed system. Spare parts shall be suitably packaged and identified by nameplate, stamping or tagging. Furnish the following:

1. Four keys or tools for resetting manual stations
2. Four keys for locks of control panels or cabinets
3. Two of each type smoke sensors with bases
4. Two of each type control module
5. Two of each type of monitor module
6. Three fuses of each type provided. Spare fuses shall be mounted in fuse-holder located inside each control panel
7. One of each type audio/visual device
8. One of each type visual device
9. Two boxes (min. 200 sheets per box) of printer paper
10. Five printer ribbons

D503003 TELECOMMUNICATIONS SYSTEMS

Structured Cabling Systems shall be in accordance with UFC 3-500-10N.

D503003 1.1 - PERFORMANCE VERIFICATION TESTS

Test telecommunications systems in accordance with applicable EIA/TIA requirements.

D503004 PUBLIC ADDRESS SYSTEMS

Public Address and Paging systems shall be in accordance with UFC 3-500-10N.

D503004 1.1 - PERFORMANCE VERIFICATION TESTS

Tests shall include originating and accepting messages at each station, at proper volume levels, without cross-talk or noise from other links or non-designated units. Test shall utilize the phonetically balanced monosyllabic work intelligibility test in accordance with ANSI S3.2 (ASA 85). In order to be acceptable, a score of at least 75 percent must be obtained for each system test.

D503005 INTERCOMMUNICATIONS SYSTEMS

Intercommunication systems shall include public address and paging functionality and shall be in accordance with UFC 3-500-10N.

D503005 1.1 - PERFORMANCE VERIFICATION TESTS

Tests shall include originating and accepting messages at each station, at proper volume levels, without cross-talk or noise from other links or non-designated units. Test shall utilize the phonetically balanced monosyllabic work intelligibility test in accordance with ANSI S3.2 (ASA 85). In order to be acceptable, a score of at least 75 percent must be obtained for each system test.

D503007 TELEVISION SYSTEMS

D503007 1.1 - COMMUNITY ANTENNA SYSTEM (CATV)

CATV systems shall be in accordance with UFC 3-500-10N.

D503007 1.2 - PERFORMANCE VERIFICATION TESTS

Confirm design and installation is in compliance with NCTA-02, 47 CFR 76.605 and in accordance with FCC proof of performance requirements. Test plan shall define tests required to ensure that the system meets technical, operational, and performance specifications. Test plan shall include plan for testing for signal leakage. Conduct testing at each of the following points in the system:

a. At each outlet.

b. Headend and Distribution amplifier inputs and outputs.

D503008 ELECTRONIC SECURITY SYSTEMS (ESS)

D503008 1.1 - Electronic Security Systems shall consist of the following:

a. Automated Access Control System (AACS)

b. Close Circuit Television (CCTV)

c. Data Transmission Media (DTM)

d. Intrusion Detection System (IDS)

D503008 1.1.1 - Automatic Access Control System (AACS)

Automatic Access Control System shall be in accordance with UFC 3-500-10N and UFGS 28 16 00.00 20.

D503008 1.1.2 - Close Circuit Television (CCTV)

Close Circuit Television shall be in accordance with UFC 3-500-10N, UFGS 28 16 00.00 20 and UFGS 28 20 00.00 20.

D503008 1.1.3 - Data Transmission Media (DTM)

Data Transmission Media shall be in accordance with UFC 3-500-10N, UFGS 28 16 00.00 20 and UFGS 28 20 00.00 20.

D503008 1.1.4 - Intrusion Detection System (IDS)

Intrusion Detection System shall be in accordance with UFC 3-500-10N, UFGS 28 16 00.00 20 and UFGS 28 20 00.00 20.

D503008 1.1.5 Design Requirements

Provide new basic intrusion detection system (IDS), including associated equipment and appurtenances. Provision of IDS shall include supervising installation of rigid or flexible conduit for IDS during site preparation, running system wires and cables, and system component installation, component testing, and system checkout. Each system shall be complete and ready for operation.

D503099 OTHER COMMUNICATIONS AND ALARM SYSTEMS

D503099 1.1 - MASS NOTIFICATION SYSTEM (MNS)

Mass Notification System (MNS) shall be in accordance with UFC 4-021-01. When feasible, interface the Notification Appliance Network with the Public Address System. Coordinate requirements with D503004 Public Address Systems.

D503099 1.2 - PROTECTED DISTRIBUTION SYSTEMS (PDS)

Protected Distribution Systems shall be in accordance with UFC 3-500-10N.

D5090 OTHER ELECTRICAL SERVICES

D509001 GENERAL CONSTRUCTION ITEMS (ELECTRICAL)

D509001 1.1 - FIRESTOPPING

Conduits, cable trays and busways that penetrate fire-rated walls, fire-rated partitions, or fire-rated floors shall be firestopped in accordance with Section C10 “Interior Construction”.

D509001 1.2 - SPECIAL TOOLS AND EQUIPMENT

Provide any special tools and test equipment required for normal operation and routine maintenance of electrical equipment, luminaires, etc., including, but not limited to, special screw drivers for tamperproof screws, breaker carts and lifts for drawout circuit breakers, battery maintenance equipment, etc.

D509001 1.3 - RACEWAYS

Raceways and conduit shall be in accordance with UFC 3-500-10N.

D509001 1.4 - CONDUCTORS

Conductors shall be in accordance with UFC 3-500-10N.

D509002 EMERGENCY LIGHTING AND POWER

D509002 1.1 - STANDARD EMERGENCY LIGHTING AND POWER

Emergency lights and exit lights shall be in accordance with UFC 3-500-10N.

D509002 1.2 - EMERGENCY GENERATORS

When an emergency generator is required, the Designer of Record shall utilize UFGS Specification Section 26 32 13.00 20, “Single Operation Generator Sets” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

D509002 1.3 - AUTOMATIC TRANSFER AND BYPASS/ISOLATION SWITCHES

When an Automatic Transfer Switch is required, the Designer of Record shall utilize UFGS Specification Section 26 36 23.00 20 “Automatic Transfer Switches” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

D509002 1.4 - UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM

UPS systems shall be in accordance with UFC 3-520-01.

D509003 GROUNDING SYSTEMS

Grounding systems shall be in accordance with UFC 3-500-10N, NFPA 70. In addition, NFPA 780 shall apply when a lightning protection system is required.

D509003 1.1 - PERFORMANCE VERIFICATION TESTS

Maximum resistance-to-ground of grounding system shall be in accordance with NFPA 70. Take measurements in normally dry weather, not less than 48 hours after rainfall.

D509004 LIGHTNING PROTECTION

Lightning protection shall be furnished and installed by a firm actively engaged in the installation of Master Labeled lightning protection systems. Upon completion of the installation, Contractor shall furnish the Master Label issued by UL for the system.

D509005 ELECTRIC HEATING

Electric heating shall be in accordance with Section D30 “HVAC”. Provide power connections as required for all systems and equipment

D509006 ENERGY MANAGEMENT CONTROL SYSTEM

Energy Management Control System shall be in accordance with Section D30 “HVAC”. Provide power connections as required for all systems and equipment. Coordinate connection requirements with switchgear and/or pad mounted transformer kWH metering.

--End of Section--

SECTION E10

EQUIPMENT
07/04

E10 GENERAL

E10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for special equipment and furnishings.

E10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

E10 1.2.1 - Industry Standards and Codes

Occupational Safety and Health Association (OSHA)

Life Safety Code

National Association of Food Equipment Manufacturers

International Building Code (IBC)

E10 1.2.2 – Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings

E10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design,”

UFC 1-300-09N, “Design Procedures,”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements,”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

E10 1.4 - QUALITY ASSURRANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

E10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory exterior enclosure system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

E10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

E10 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

E10 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Day Gates; G

Security Vault Doors; G

SD-03 Product Data

Day Gates; G

Equipment and Fixtures; G

Kitchen Equipment; G

Security Vault Doors; G

SD-10 Operation and Maintenance Data

Kitchen Equipment; Data Package 3, G

E1010 COMMERCIAL EQUIPMENT

E101005 SECURITY & VAULT EQUIPMENT

E101005 1.1 - VAULT AND DOORS

The Armory spaces shall be designed in accordance with criteria in MIL-HDBK-1013/1A to provide at least 10 minutes of delay time against low and medium threat severity levels of forced entry. The spaces are required to be built to the construction standards described in MIL-HDBK-1013/1A for Class A vaults. The reinforced concrete must have minimum 28-day compressive strength of at least 20,684 kPa (3000 PSI) and the floor, walls, and ceiling/roof components of this space must all be cast in place and at least 200 mm (eight inches) thick. The door into the Armory spaces must be GSA-Approved and labeled Class 5 Security Vault Doors that conform to Federal Specification AA-D-00600. Provide door manufacturer’s modified standard or custom Day Gate, designed for use with the vault doors furnished, for access control and weapons issue. Except for the door openings, penetrations and openings through the structural “security” envelope of the walls, and/or ceiling/roof of the Armory spaces that are 618 sq. cm (96 sq. in) or greater with the least dimension greater than 150 mm (6 inches) are not allowed. Section D50, “Electrical”, includes requirements for Intrusion Detection System (IDS) within the spaces and for Security Lighting at the outside of the Vault Doors to the spaces.

E101005 1.1.1 - Set-backs

Where the perimeter walls of the WSA spaces are part of the facility exterior walls, the vault walls shall be set back from the exterior part of the exterior wall to allow at least 100 mm (4 inches) for the normal wall facing to cover the vault walls.

E101005 1.1.2 - Egress

Where a WSA space exceeds 90 sq m (1000 square feet) in floor area, or will have more than eight occupants, the space shall have a minimum of 2 exits for safety purposes. When more than one entrance / exit is required, each shall be equipped with a Security Vault Door, with only one used for normal entry access.

E101005 1.2 - SECURITY VAULT DOOR

Security Vault Doors must be GSA-Approved and labeled Class 5 Security Vault Doors that conform to Federal Specification AA-D-00600. The combination lock that is required as part of each Security Vault Door is an electronic-mechanical item that must be Year 2000 Compliant.

Provide GSA-Approved and labeled Class 5 Security Vault Door that conforms to Federal Specification AA-D-00600. Doors for normal entry accessshall be Class 5, either Type IIR- right opening swing without optical device or Type IIL- left opening swing without optical device as determined by design arrangement, Style K- Key change combination lock, Design S- single lock.

Where a second door is required for safety purposes, doors for exit only shall be Class 5, either Type IR- right opening swing with optical device or Type IL- left opening swing with optical device as determined by design arrangement, Style K- Key change combination lock, Design B- no exterior hardware.

E101005 1.3 - DAY GATE

Provide vault door manufacturer's modified standard or custom day gate designed for use with each vault entry door furnished, for access control and weapons issue. Day gate construction shall be minimum 3.4 mm (10 gage) steel flattened and expanded metal welded to a 25 mm (1 inch) minimum steel channel or angle welded frame; expanded metal pattern shall be 25 by 45 mm (1 by 1.75 inch) diamond grid. Maximum clearance between sides, top and bottom of the day gate and the vault door-frame and floor shall be 25 mm (1 inch) when the day gate is closed. Provide gate hinged on same side as the vault door, swinging to 180 degrees into the vault from closed to open positions. Provide day gate with locking device operable from both sides; the outside by key and the inside by key, knob, lever, or deadbolt; the inside locking device shall either be positioned so that it is not accessible from the outside or it shall be operable by key only. Day gate shall include an issue port opening, cover with locking mechanism, and shelf. The issue port shall be a framed opening welded to the day gate frame with a hinged door cover. The hinged door shall be minimum 1.2 mm (18 gage) steel and shall be lockable from the inside only. The opening shall be 200 mm (8 inches) high and 300 mm (12 inches) wide; tolerances are plus or minus 3.2 mm (0.125 inch). When the issue port is closed, the hinged door cover shall match the opening to within 1.6 mm (0.0625 inch). The shelf shall be minimum 1.5 mm (16 gage) stainless steel, 300 mm (12 inches) deep by 300 mm (12 inches) wide to match the port opening, and shall be capable of withstanding a vertical force of 445 N (100 lbf) at any point without deformation. Provide the manufacture's standard painted finish to match that of the vault door. The day gate shall not interfere with the operation of vault door inner escape device.

E1040 GOVERNMENT FURNISHED EQUIPMENT

Refer to the project program for the following Government Furnished/Government Installed (GF/G!)items:

E104001 SMART BOARD

E104002 OVERHEAD PROJECTOR

E104003 VIDEO TELECONFERENCING EQUIPMENT

E1090 OTHER EQUIPMENT

E109002 FOOD SERVICE EQUIPMENT

E109002 1.1 - RESIDENTIAL OR LIGHT COMMERCIAL ELECTRIC KITCHEN EQUIPMENT

E109002 1.1.1 - Refrigerator

UL 250, refrigerator with frost-proof freezer, minimum 0.41 cubic meters (14.6 cubic feet).

E109002 1.1.2 - Freestanding Ice Maker

UL listed and NSF approved; self-contained, air-cooled model, minimum ice production of 161 kg (355 pounds) per 24 hours, and a minimum bin storage capacity of 82 kg (180 pounds) of ice cubes.

E109002 1.1.3 - Microwave Oven

UL 923, minimum 0.03 cubic meter (1 cubic foot) capacity.

E109002 1.1.4 - Residential Garbage Disposal

UL 430, stainless steel, continuous feed with minimum 1/3 hp motor.

-- End of Section --

SECTION E20

FURNISHINGS
07/04

E20 GENERAL

E20 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products registered shall be given preferential consideration over unregistered products and over products not carrying any EPP designation. Wherever possible (especially on projects slated for LEED), use sustainable principles when choosing collateral equipment, furnishings and other products. Electric equipment should be Energy Star compliant (or equivalent) and should use less than 1 watt when in the standby mode. Furnishings should be constructed of low emitting materials, environmentally preferable products and products containing recycled materials to the greatest extent possible.

E20 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specification (UFGS) Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

E20 1.2.1 - Industry Standards

International Building Code (IBC)

E20 1.2.2 - Government Standards

OCCUPATIONAL SAFETY AND HEALTH ASSOCIATION (OSHA)

E20 1.3 - GENERAL REQUIREMENTS

E20 1.3.1 - The Structural Interior Design (SID) for furnishings for this project consists of the design, construction and installation of pre-manufactured fixed furnishings. All design shall be in accordance with UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-800-10N, “Design: General Environmental Requirements,” and UFC 3-120-10 “Design: General Interior Design Requirements.” The Contractor shall provide and install high quality commercial grade, metal horizontal mini-blinds at each exterior window and at each interior window where privacy may be required.

E20 1.3.2 - The Comprehensive Interior Design (CID), for this project, consists of selection and specification of Furnishings, Fixtures & Equipment Interior Design (FF&E) conventional loose furnishings for all areas as indicated in the Room Requirements Matrix for this facility. Selections shall be made in accordance with the Federal Acquisition

Regulations (FAR) Part 8 Required Sources of Supply. Movable furniture and furnishings shall be developed primarily from General Service Administration (GSA) Federal Supply Schedules. Other government sources shall be considered as appropriate. The movable furniture and furnishings shall be submitted as Comprehensive Interior Design (CID). A minimum of four meetings and three submittals shall be required.

The CID package shall be fully coordinated with the SID for furnishings of this section and of Sections C10 Interior Construction and C30 Interior Finishes. All design shall be in accordance with UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” and the DRAFT UFC 3-120-10 “Design: General Interior Design Requirements.”

E20 1.3.3 - Coordinate all finishes and colors of all fixed and moveable furnishings with Sections C10 Interior Construction and C30 Interior Finishes.

E20 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

E20 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory furnishings system performance shall be via Performance Verification Testing, as detailed in this section of the RFP.

E20 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures”, UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-120-10 (DRAFT) “Design: General Interior Design Requirements.” The design requirements addressed herein supersede those referenced in UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” and the detailed Design Submittal requirements outlined later in this Section E20.

E2010 FIXED FURNISHINGS

The Base Price Proposal for fixed furnishings shall include, but not be limited to, the design, construction/purchase, and installation of casework. Also included, but not be limited to, is the provision and installation of window blinds, shelving, service counters, upper and base cabinets w/sink, lavatory counters, presentation/marker boards, bulletin boards, lockable, glass-enclosed bulletin boards and pull-down movie screens and other pre-manufactured furnishings as approved (see Section C10).

Spaces indicated on Finish Schedule shall receive cabinetry of custom, hardwood construction and include kitchen upper and base cabinet w/full-size sink, as required. All countertops and backsplashes shall receive solid surface material such as Wilsonart “Gibralter,” or equal.

Coordinate with all fixed and movable furnishings and with all applicable building systems.

E201002 WINDOW TREATMENTS

Provide interior window coverings, associated hardware and controls at each exterior window and at any interior view window where privacy may be required. Refer to the Project Program for size, pattern and style of window treatments.

E201002 1.1 - Horizontal mini-blinds shall be one-inch horizontal room-darkening commercial grade aluminum at a minimum thickness of 0.2mm (0.008”) (after coating) with a minimum of 45.72 slats per meter (15 slats per foot). Color shall match window frames.

E2020 MOVABLE FURNISHINGS

The Contractor shall include all effort and associated costs required to develop the FF&E (CID) package. The effort includes, at a minimum but is not limited to, furniture and furnishings layouts, inventory of reusable existing furniture, as required, the selection of all movable furniture and furnishings including all finishes and fabrics and the preparation of supporting plans and procurement data (specifications), cost estimates, all presentation and reproduction materials, and all necessary meetings.

a) At the beginning of the facility design, the Contractor’s Project Manager or his designated representative and the Project Interior Designer are required to attend an orientation at Naval Facilities Engineering Command (NAVFAC) Southeast located in Charleston, SC. Other attendees are welcome at the Contractor’s discretion. The Interior Designer attending shall be the professional assigned to do the work throughout the duration of the project. Contact Peggy Noland at 843-820-5736 or margaret.noland@navy.mil to begin the process. **During the orientation, the required Interior Design process shall be reviewed in detail including the four required design meetings and the three required design submittals.** These are minimum requirements and the Contractor shall be prepared to provide any/all additional meetings and/or submittals necessary to support the Interior Design effort/collateral equipment coordination to produce a complete and fully integrated initial outfitting furniture and furnishings FF&E (CID) package.

b) The orientation shall be followed by in-depth customer interviews to determine actual initial outfitting requirements, color preferences, and other related input. (Note: Any information provided on the Room Requirements matrix relating to furniture is for planning purposes only.) The interviews shall be conducted by the Contractor’s Interior Designer and minutes of the meetings provided to the Customer and the NAVFAC Southeast Interior Designer within 14 days of each interview. The Contractor’s Interior Designer shall be required to conduct Customer interviews on site. The customer shall have final approval on all design decisions.

c) Customer interviews for each facility shall be followed by: a Concept submittal, a Concept presentation, a Design Review meeting, a Pre-final Submittal and a Final Submittal to NAVFAC Southeast. The specifics of these requirements will be addressed during the orientation meeting.

d) **Throughout the facility design process the FF&E (CID) shall be fully integrated and demonstrate complete coordination with every architectural and engineering aspect of the building design.**

e) It is the Government’s intent to incorporate support services to include the purchase and installation of movable furniture and furnishings into this contract using the plans and specifications prepared under the Contractor’s Base Price Proposal. If funds from a separate funding source are obtained, a contract modification shall be issued to incorporate these services. If the contract modification is awarded,

the Contractor shall purchase all movable furniture and furnishings. As part of the modification, the Contractor shall provide all services related to furniture installation including receiving, storing if required, staging, installing, adjust/level/aligning, removing and disposing of all trash, and touch-up as required all furniture and furnishings ordered. All movable furniture and furnishings shall be installed complete and ready to use in accordance with the manufacturers' instructions by certified (manufacturer approved) furniture installers. All furniture and furnishings shall be level and aligned and all doors, drawers, and accessories shall be level and aligned to open, close, and/or otherwise operate smoothly and securely. The Contractor shall in no way jeopardize the furniture and furnishings warranties. The Contractor shall repair, to the Customer's satisfaction, any/all damage to any facility finish that is a result of the furniture installation. If the contract modification is issued, all Contractor support services involving movable furniture and furnishings shall be completed within the specified construction contract completion date for the building.

f) The collateral equipment budget shall be provided after contract award. The budget shall be comprehensive and include the cost of the movable furniture and furnishings, freight, installation, and the Contractor's administrative fee (10% of the cost of the movable furniture and furnishings). In other words, all costs associated with providing a fully furnished facility as specified in the CID packages. *The Contractor's administrative fee shall cover the cost of overheads, bonds, insurance, and any/all other associated furniture and furnishings costs if the turnkey modification is exercised. No other mark-ups shall be allowed.*

g) The Contractor's Interior Designer shall coordinate the movable furniture and furnishings budget with the customer's requirements to assure the total initial outfitting requirements are within the total collateral equipment budget.

h) If the option for a turn-key furniture installation is used, the Contractor will be acting as an agent for the Government, purchasing under Federal Contract, i.e., GSA, and shall not be charged or assessed Federal or State taxes. The contractor shall obtain a Resale Permit from the State Board of Equalization. Under regulation 1521, construction contractors performing work for the US Government are not required to charge the government sales tax for the purchase of furniture. Any items purchased as building materials such as carpet are taxable. In addition, the Government Contracting Officer (via the ROICC Office) must issue a Letter of Authorization for the contractor to use Government Supply Sources. For some projects, this letter is all that is required to address sales tax issues. See attached link: http://www.acq.osd.mil/dpap/dfars/html/previous/r20031001/251_1.htm.

i) All Contractor services involving movable furniture and furnishings shall be completed within the specified construction contract completion date for the building.

j) If the contract modification is not awarded, the Government shall be responsible for purchasing, receiving, staging, installing, adjust/level/aligning, removing and disposing of all trash, and touch-up as required for all movable furniture and furnishings included in the FF&E (CID) package prepared under the Contractor's Base Price Proposal. Any/all Government effort to install furniture and furnishings shall take place after the construction contract completion date.

DESIGN SUBMITTALS

A minimum of three design submittals shall be required and shall include a concept, pre-final, and final. The Interior Designer shall be prepared to provide additional submittals as may be necessary to assure a complete, useable, and fully integrated FF&E (CID) package. The specifics of the design submittal requirements will be discussed in detail during the orientation meeting.

Synopsis of required Design Submittal Elements:

a) Concept Submittal – Physical finish/fabric samples and furniture illustrations associated with movable furniture and furnishings shall be submitted. Samples must be large enough to show full pattern and color. Photographs of samples are not acceptable. Each movable furniture and furnishings item shall be addressed and all information submitted must accurately represent the Interior Designer's intent. Coded comprehensive furniture and furnishings layout plan(s) shall be included. A preliminary estimated cost summary, including the cost of each movable furniture and furnishings item shall be provided. Any/all associated costs shall be included as separate line items (i.e., freight, installation, Contractor's 10% administration fee for turnkey, contingencies, etc.). Include other additional information as needed to provide a complete submittal. Provide one package to the NAVFAC Southeast Interior Designer for review and discussion. Then provide one copy to the Customer at Stennis Space Center, MS for review.

b) Pre-Final Submittal – Revised/updated Concept Submittal with all presentation and design review meeting comments incorporated, coded comprehensive furniture and furnishings layout plan(s), and a cost summary shall be provided. Add procurement documentation (specifications) for each approved movable furniture and furnishing item. Include other additional information as needed to provide a complete submittal. Provide one copy to the NAVFAC Southeast Interior Designer.

c) Final Submittal – Revised Pre-Final with all review comments incorporated, coded comprehensive furniture and furnishings layout plan(s), and a final cost summary shall be provided. Include other additional information as needed to provide a complete submittal. Provide three complete final copies in a three-ring binder format for distribution to the NAVFAC Southeast Interior Designer, the Customer, and the ROICC. Provide an electronic copy of the plans and specifications.

d) All movable furniture and furnishings selections shall be made in accordance with the Federal Acquisition Regulations (FAR) Part 8 Required Sources of Supply using primarily General Service Administration (GSA) Federal Supply Schedules. Other government sources, including Federal Prison Industries UNICOR, shall be considered.

e) A best value determination shall be made in the process of selecting furniture and furnishings. Best Value Determination shall be performed on at least 3 manufacturers for furniture items exceeding a total of $2,500. Current written price quotes from vendors and signed best value determination statements may be required to substantiate the best value decisions. The determination shall be submitted as part of the FF&E (CID) package. The best value determination shall address space planning; human factors data related to anthropometrics (reach, clearance, adjustability), space, and acoustics; ergonomics; product quality (including construction and materials); product warranties; history of the product and/or manufacturer; ability to service products through quality dealers or others within a certain geographical range of the project; price (including freight); aesthetics; appropriateness; and lighting, power and telecommunications systems management and/or coordination as related to the facility (when applicable); and other project specific factors as identified and/or required. Emphasis shall

be to create a fully integrated design solution by providing quality products to meet, at least, the minimum functional needs of the customer. Customer preferences shall be considered. The focus shall be on the best overall value. Include with Pre-Final and Final Submittals.

f) Written assurance from the manufacturer that all finishes/colors for fixed furnishings and all finishes/colors and fabrics for movable furniture and furnishings items are current and shall be available at the time of construction is required. Substitutions, during construction, of any of the finishes, fabrics, and/or colors approved during design shall not be accepted. Include with Pre-Final and Final Submittals.

g) Minutes of all meetings and significant telephone conversations shall be provided. Include with all submittals.

Task Summary:

	TASK	Meeting		Submittal	
		Gov	AE	Gov	AE
1	Orientation	•	•		
2	Interviews		•		
3	Concept Submittal				•
4	Concept Submittal Review			•	
5	Presentation		•		
6	Presentation Review		•		
7	Pre-Final Submittal				•
8	Pre-Final Submittal Review			•	
9	Final Submittal				•

CONSTRUCTION SUBMITTALS

SD-02 Shop Drawings - All fixed furnishings.

SD-10 Operation and Maintenance Data - All fixed furnishings.

E202001 MOVABLE ARTWORK

Select artwork for wall installation throughout the facility. Type of artwork to be determined by client requirements and budget as described in the Project Program for the project. Install framed artwork 1600mm (63 inches) on center above finished floor. Include security mounting hardware as required.

E202002 MODULAR PREFABRICATED FURNITURE

E202002 1.1 - SYSTEMS PRE-WIRED FURNITURE

Select products from any of the following: Steelcase, Teknion, Herman Miller, or Knoll or other Class A systems furniture manufacturer. The typical workstation shall maximize each allocated space with high pressure laminate worksurfaces and overhead closed storage with a surface to accommodate a government provided computer. An attached articulated

keyboard/mouse tray shall be provided. Provide indirect lighting on top of each wordstation in addition to task lighting. Powered raceways that will accommodate data and voice wire management shall be completely coordinated with all facility systems. The Contractor's Interior Designer shall ensure the coordination of all electrical/data and furniture locations. The Contractor shall provide and coordinate all telecommunication receptacles and outlet requirements (i.e. RJ 11/45 receptacles and cover plates) with the Contractor's Interior Designer and the systems furniture installer. The Contractor shall be responsible to hardwire all pre-wired furniture with the building systems. The Contractor shall be responsible for coordinating all IT and telephone connections.

E202002 1.2 - MODULAR FREESTANDING FURNITURE AND WORKSTATIONS

Select modular furniture with electrical/data cable trays and grommet holes for private offices and smaller work areas. Furniture may be specified from the same manufacturer as the systems furniture or Paoli, Gunlocke, Kimball, HBF, or equal. An attached articulated keyboard/mouse tray shall be provided. Wood stain finish shall coordinate with all wood stains used in the building. Include accommodation for a government provided computer and printer. Each private office or work area shall have appropriate task lighting.

E202003 FREESTANDING FURNITURE

E202003 1.1 - SEATING

E202003 1.1.1 - Task Seating

Select task seating that is fully ergonomic and coordinated by finish and scale to the workstation. Seating specifications to include: adjustable arms, back, height, and seat pan; 5 star base, appropriate castors for floor surface, lumbar support and availability in a minimum of two (2) sizes. Specify task seating from the same manufacturer of the systems or major furniture supplier or seating manufacturer approved by the Division Interior Designer, provided it is determined to be a GSA "Best Value"

E202003 1.1.2 - Lounge, Reception and Guest Seating

Select lounge, reception and guest seating with upholsteries consistent with the Project Program.

E202003 1.1.3 - Conference Room/Training Room Seating

Select seating with passive ergonomic features in that the seat and back offers some synchronized movement to allow the person seated to change positions. The support can be legs, sled base or single pedestal with 5 star base and casters as determined by user requirements. Provide high density stack chairs or nesting chairs as required. Provide attached, storable tablet arm as required.

E202003 1.2 - STORAGE AND FILING

Select freestanding storage units, file cabinets and file safes to accommodate the specific and unique storage requirements of the user. Coordinate closely with storage provided in Section E10 Equipment for high density filing. Provide appropriate structural support and electrical coordination, as required.

E202003 1.3 - TRAINING/CONFERENCE ROOM FURNISHINGS

E202003 1.3.1 - Tables

Select single or multi-person worksurfaces or tables as determined from user requirements. Where computers are used, provide tables with wire management capability or pre-wired tables to accommodate data/telecommunications requirements. Powered raceways that will accommodate data and voice wire management shall be completely coordinated with all facility systems. The Contractor's Interior Designer shall ensure the coordination of all electrical/data and furniture locations. The Contractor shall provide and coordinate all telecommunication receptacles and outlet requirements. The Contractor shall be responsible to hardwire all pre-wired furniture with the building systems. The Contractor shall be responsible for coordinating all IT and telephone connections.

E202003 1.3.2 - Fixed Presentation Furnishings

E202003 1.3.2.1 - Coordinate with building construction to include appropriate communications/data outlets, blocking and structural support for the installation of electronic whiteboards ("smartboards"), markerboards and tackboards.

E202330 1.3.2.2 - Select and provide markerboards with porcelain on steel writing surfaces for use on gypsum board wall construction. Note: Movable walls provided by the Contractor shall have white, back-painted glass for use as marker boards in private offices, conference rooms and open conference areas.

E202003 1.3.3 - Movable Presentation Furnishings

Select audio-visual carts, lecterns, multi-media presentation cabinets to accommodate power/data requirements.

E202004 ACCESSORIES

E202004 1.1 - LAMPS

Provide decorative lamps. Refer

E202004 1.2 - INTERIOR LANDSCAPING

E202004 1.2.1 - Select artificial plants of a variety of sizes and 'species' to provide interior landscaping as reqyured.

E202004 1.3 - OTHER DECORATIVE ITEMS

Refer to the Project Program for requirements.

E202099 OTHER MOVABLE FURNISHINGS

E202099 1.1 - MISCELLANEOUS ITEMS

E202099 1.1.1 - Select waste receptacles, recycling containers, and ash urns as required.

E202099 1.1.2 - Select clocks, wall mounted or freestanding literature and coat racks, and mirrors as required.

E202099 1.1.3 - Select small appliances such as coffee pots, microwaves, refrigerators, washers, dryers, and icemakers, as required.

E202099 1.1.4 - Select mailroom work and storage tables, mail sorter units, carts and equipment tables as required.

-- End of Section --

SECTION F10

SPECIAL CONSTRUCTION
07/04

F10 GENERAL

F10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the requirements for special structures and special construction systems.

F10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

F10 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

F10 1.2.2 - Government Standards

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, “Design: General Building Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

OPNAVINST 5530.13C, “Physical Security Instruction for Conventional Arms, Ammunition and Explosives (AA&E)”

DoD 5100.76-M, “Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives”

F10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-200-01, “General Building Design”

UFC 1-300-09N, “Design Procedures”

UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements”

UFC 3-300-10N, “Design: General Structural Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-500-10N, “Design: General Electrical Requirements”

UFC 3-600-10N, “Design: General Fire Protection Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

F10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards prior to acceptance of the work. Items found not in compliance with the construction documents by the Designer of Record shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

F10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “DESIGN SUBMITTAL PROCEDURES”, and Section 01332N, “CONSTRUCTION SUBMITTAL PROCEDURES” for additional requirements.

F10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “DESIGN SUBMITTAL PROCEDURES,” UFC 1-300-09N, “Design Procedures,” UFC 3-100-10N, “Design: General Architectural and Interior Design Requirements,” UFC 3-300-10N, “Design: General Structural Requirements,” UFC 3-400-10N, “Design: General Mechanical Requirements,” UFC 3-500-10N, “Design: General Electrical Requirements,” and UFC 3-600-10N, “Design: General Fire Protection Requirements.”

F10 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

F10 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Metal Building Systems; G

SD-03 Product Data

Metal Building Systems; G

SD-10 Operation and Maintenance Data

Metal Building Systems, Data package 1; G

F1010 SPECIAL STRUCTURES

F101001 METAL BUILDING SYSTEMS

F101001 1.1 - DESIGN REQUIREMENTS

All structural design shall comply with the provisions of Section B10 of the Navy Technical Guide. The steel structure shall be column with rigid frame, or rigid frame, Type 1, in accordance with AISC M016, except that end frames may be of rigid frame or beam and column design. Main frame tie rods shall be provided between the columns. Tie rods shall be concrete encased. Design framed openings structurally.

F10 1.1.1 - Importance Factors

The Occupancy Category for determining Importance Factors for seismic, snow, and wind design shall be IV in accordance with Table 1 of UFC 3-310-01.

F10 1.1.2 - Wind Exposure

Wind design shall be based on the IBC, ASCE 7-02, and UFC 3-310-01 for a coastal hurricane prone region.

F101001 1.1.3 - Seismic Loads

Design shall be as required to resist the effects of earthquake motions per ASCE 7 at the Project Site.

F101001 1.1.4 - Deflection

F101001 1.1.4.1 - Structural Members

a. Maximum deflection of main framing members and for roof members shall not exceed $1/180^{th}$ of their respective spans.

b. Purlins and Roof Panels: The deflection due to live, snow, or wind shall not exceed L/180. The design analysis shall establish that the roof when deflected under dead plus live or snow loads will not result in a negative gradient. Maximum deflections shall be based on sheets continuous across two or more supports with sheets unfastened and free to deflect. Provide bracing of purlin compression flanges as required to resist applied loading.

F101001 1.1.4.2 - Roof Decking

UL 580, Class 90. Roof decking shall be designed for a 91 kg (200-pound) concentrated load at mid-span on a 300 mm (12-inch) wide section of deck. When used as a diaphragm, roof decks shall be designed in accordance with SDEI DDM.

F101001 1.1.4.3 - Wall Panels

Maximum deflection of wall panels due to wind loads shall be limited to $1/120^{th}$ of their respective spans.

F101001 1.2 - WALL AND ROOF MATERIALS

F101001 1.2.1 - Aluminum/Zinc-Coated Steel Sheet

ASTM A 792/ A 792M, AZ 55

F101001 1.3 - FRAMING AND STRUCTURAL MEMBERS

F101001 1.3.1 - Steel

ASTM A 992 / A 992M, ASTM A 529/ A 529M, ASTM A 572/ A 572M, or ASTM A 588/ A588M

F101001 1.3.2 - Structural Tube

ASTM A 500 or ASTM B 221

F101001 1.4 - MISCELLANEOUS ITEMS

F101001 1.4.1 - Fasteners

Fasteners shall be compatible with the materials they are fastening to, be gasketted when exposed to weather to prevent leaks, and shall provide both shear and tensile strengths not less than 3,336 N (750 pounds) per fastener. Exposed fasteners shall be color coated to match wall/roof panels.

F101001 1.4.2 - Insulation

Blanket-type fiberglass insulation with a factory applied facing on one side and having a permeance rating of 0.05 or less in accordance with ASTM E 96.

a. Flame Spread Rating 75 or less, and a Smoke Developed Rating of 150 or less when tested in accordance with ASTM E 84.

b. Insulation R-value as shown on drawings in accordance with ASTM C 236.

F101001 1.5 - FINISH

Metal wall and roof panels, as well as accessories, shall be coated with a high performance factory applied finish coating. The finish coating shall be 1.6 to 1.8 mils in thickness and shall meet or exceed the following test results as obtained by a certified independent testing laboratory, and in conformance with the ASTM Standards referenced:

a. Salt Spray Test: ASTM B 117, minimum of 1000 hours exposure. Undercutting of the paint film from the score line shall not exceed 1.6 mm (1/16 inch).

b. Accelerated Weathering Test: ASTM G 23, Method 2, Type D apparatus, minimum 2000 hours, with no checking, blistering, or loss of adhesion; color change less than 5 NBS units by ASTM D 2244 and chalking less than No. 8 rating by ASTM D 4214.

c. Flexibility: ASTM D 522, Method A, 3.2 mm (1/8 inch) diameter, 180 degree bend, no evidence of fracturing to the naked eye.

d. Adhesion: ASTM D 3359, Method B, for laboratory test and film thickness less than 5 mil and Method A for site tests. There shall be no film removed by tape applied to 11 parallel cuts spaced 3.2 mm (1/8 inch) apart plus 11 similar cuts at right angles.

e. Impact: ASTM D 2794: no loss of adhesion.

f. Humidity Resistance: ASTM D 2247, 2000 hours, with no signs of blistering, cracking, creepage or corrosion on score panel.

g. Abrasion: ASTM D 968, Method A, falling sand shall not expose substrate when tested in quantities 50 to 60 L (13.2 to 15.9 gallons) of sand per mil of thickness.

F1030 SPECIAL CONSTRUCTION SYSTEMS

F103001 VAULTS

Construct floors, walls, and roof of weapons storage areas in accordance with the requirements of OPNAVINST 5530.13C and DoD 5100.76M.

See Section E10 for vault doors and day gates.

-- End of Section --

SECTION G10

SITE PREPARATIONS
07/04

G10 GENERAL

G10 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes site clearing, demolition, relocations, and earthwork.

G10 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications (UFGS) Web Page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

G10 1.2.1 - Industry Standards and Codes

International Building Code (IBC)

G10 1.2.2 - Government Standards

CORPS OF ENGINEERS (COE)

COE EM 385-1-1, “Safety and Health Requirements Manual”

NAVY DESIGN MANUALS (DM)

DM- 7.02, “Foundations and Earth Structures”

MILITARY HANDBOOK (MIL-HDBK)

MIL-HDBK 1007.3, “Soil Dynamics and Special Design Aspects”

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-300-09N, “Design Procedures”

UFC 3-200-10N, “Design: General Civil/ Geotechnical/Landscape Requirements”

UFC 3-220-01, “Geotechnical Engineering”

UFC 3-260-01, “Airfield and Heliport Planning and Design”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 31 23 00.00 20, “Excavation and Fill”

U.S. DEPARTMENT OF TRANSPORTATION (USDOT)

MUTCD, “Manual on Uniform Traffic Control Devices”, 2003

G10 1.3 - GENERAL REQUIREMENTS

All work shall comply with the publications included under paragraph “Design Guidance.”

G10 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found to be not in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

G10 1.4.1 - Earthwork

Perform field quality control required in Section 31 23 00.00 20, “Excavation and Fill”.

G10 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, DESIGN SUBMITTAL PROCEDURES and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES for additional requirements.

Verification of satisfactory earthwork performance shall be via testing detailed in the paragraph, “Field Quality Control”, in Section 31 23 00.00 20, EXCAVATION AND FILL.

G10 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures,” UFC 1-300-09N, “Design Procedures”, UFC 3-200-10N, “Design: General Civil/Geotechnical/Landscape Requirements”, and UFC 3-800-10N, “Design: General Environmental Requirements.”

G10 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

G10 1.7 - CONSTRUCTION SUBMITTALS

Submit in accordance with Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES, Section 31 23 00.00 20, EXCAVATION AND FILL, and the following:

SD-01 Preconstruction Submittals

Demolition Plan; G

Erosion and Sediment Control Plan; G

NPDES General Permit and SWPPP; G

Permits and licenses; G

SD-06 Test Reports

Copies of all sampling and testing data (soil, water, waste, etc.); G

SD-07 Certificates

Dewatering Work Plan; G

System installers for termite control barrier system; G

Worker training; G

Landfill certifications; G

SD-11 Closeout Submittals

EPA identifications number; G

Waste manifests; G

Shipping records; G

Closure reports; G

G10 1.8 – WETLANDS

Jurisdictional non-tidal wetlands have been identified on the project site. See additional information in Part 3 Project Program.

G10 1.9 - DEMOLITION PLAN

Demolition plans shall include procedures for careful removal of items to be demolished and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, and a detailed description of methods and equipment to be used for each operation and the sequence of operations.

G10 1.10 - EROSION AND SEDIMENT CONTROL PLAN

Erosion and sediment control plans shall include the measures required to reduce on-site erosion and off-site runoff and sedimentation. The plans shall also include tree preservation. The plans shall comply with all requirements of the State of Mississippi.

G10 1.11 - NPDES GENERAL PERMIT AND SWPPP

National Pollutant Discharges Elimination System (NPDES) General Permit for Storm Water Discharges is required for construction sites over one acre.

The Storm Water Pollution Prevention Plan (SWPPP) shall be prepared by a registered professional engineer. The SWPPP is a comprehensive program document detailing the intended methods of complying with applicable storm water management regulations and requirements. The plan shall comply with all requirements of the State of Mississippi.

G10 1.12 - GEOTECHNICAL DATA

Subsurface investigation data is included in this RFP. The Contractor's geotechnical engineer shall accomplish additional site investigation, soil borings, and laboratory testing as required with no additional cost to the government during the pre-award phase.

G10 1.12.1 - Geotechnical Report

Provide a separate, signed independent geotechnical report as required. The cost of any additional geotechnical work shall be included in the contract amount.

G10 1.13 - DEWATERING WORK PLAN

Dewatering work plans shall be prepared by a registered professional engineer as required by State laws and regulations. The plans shall include methods to be employed in removing water and disposal of the same from exposed surfaces and diverting surface water from other areas or structures.

The Design Engineer of Record shall provide inspection of excavations and soil/groundwater conditions throughout construction. The Design Engineer of Record shall be responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Design Engineer of Record shall update the Dewatering Work Plans as construction progresses to reflect changing conditions and shall submit the updated plans and a written report with professional stamp at least monthly informing the Contractor and FEAD of the status of the plans and an accounting of Contractor adherence to the plans; specifically addressing any present or potential problems. The Design Engineer of Record shall be available to meet with the Contracting Officer at any time throughout contract duration.

G1010 SITE CLEARING

G1010 1.1 - GENERAL

Clear and grub project site as required for project construction.

G1010 1.2 - BURNING

Burning is not permitted.

G101001 CLEARING

G101001 1.1 - CLEARING

The Contractor shall clear all trees, shrubs, brush and vegetation necessary for construction of the project. Clearing includes the felling, trimming, and cutting of trees into sections.

G101001 1.2 - SALVAGE

The Contractor shall save as many trees, shrubs and vegetation as possible. Preserve and protect trees, shrubs and vegetation not directly impacted by the construction and designated to be removed in accordance with Section G103011, TEMPORARY EROSION AND SEDIMENT CONTROL.

G101002 TREE REMOVAL

G101002 1.1 - TREE REMOVAL

Remove and dispose of all trees as required for construction, to a depth of at least 18 inches below ground surface. Fill depressions with satisfactory material and compact. Mound fill 2 inches above adjacent surface to allow for settling when not part of a subbase.

G101003 STUMP REMOVAL

G101003 1.1 - STUMP REMOVAL

Remove stumps to a depth of at least 18 inches below ground surface and grind stumps 18 to 30 inches below ground surface. Fill depressions with satisfactory material and compact. Mound fill 2 inches above adjacent surface to allow for settling when not part of a subbase.

G101005 GRUBBING

G101005 1.1 - GRUBBING

Within the clearing limits, remove and dispose of all logs, shrubs, brush, matted roots, roots larger than 2 inches in diameter, and other debris to a depth of at least 18 inches below ground surface. Fill depressions made by grubbing with satisfactory material and compact to make the new surface conform to the adjacent surface of the ground.

G101007 DEBRIS DISPOSAL

G101007 1.1 - DISPOSAL

Prevent spillage on pavements, streets, or adjacent areas.

G1020 SITE DEMOLITION & RELOCATIONS

G1020 1.1 - GENERAL

Demolition work shall include the demolition, removal and legal disposal of existing construction as required to accommodate the new construction. The Contractor shall take care to prevent damages to existing utilities, construction and materials not scheduled for demolition, repair or replacement, and shall repair damages to the construction and materials to the satisfaction of the Contracting Officer and at no additional cost to the Government.

G1020 1.2 - AUTHORIZATION

Do not begin demolition until the Demolition Plan has been approved by and authorization is received from the Contracting Officer.

G1020 1.3 - TITLE TO MATERIALS

Whenever possible, all features demolished shall be salvaged or recycled in lieu of being disposed of as waste in a landfill. Existing features to be demolished which are not indicated as salvageable or reused, shall become the property of the Contractor and shall be removed from project site. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition plan, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition, loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

G102002 ABOVE GROUND SITE DEMOLITION

G102002 1.1 - DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris to occupied portions of a building or on pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

G102002 1.2 - PROTECTION

G102002 1.2.1 - Traffic Control

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Provide temporary traffic control in accordance with MUTCD.

G102002 1.2.2 - Existing Work

Protect existing work that is to remain in place, be reused, or remain the property of the Government. Repair all items that are damaged during performance of the work to their original condition, or replace with new. Do not overload pavements to remain.

G102002 1.2.3 - Noise Pollution

Make the maximum use of low-noise emission products, as certified by the EPA.

G102002 1.3 - PAVING AND SLABS

Remove concrete and asphaltic concrete paving and slabs as required for construction of project. Remove the existing aggregate base in areas to receive new pavement to the depth of the proposed pavement section below new finish grade. Remove the existing aggregate base in areas not to receive new pavement to a depth of 12 inches below existing adjacent grade. Provide neat sawcuts at limits of pavement removal; protect sawcuts so that new pavement will butt against the existing without feathering.

G102003 UNDERGROUND SITE DEMOLITION

G102003 1.1 - UTILITY TERMINATION

Terminate utilities in accordance with state and local rules and regulations, the nationally recognized code, and the requirements of the utility provider covering the specific utility and approved by the Contracting Officer.

G102003 1.2 – UTILITY ABANDONMENT

Abandoned utilities shall be removed from the site completely and shall not be abandoned in place.

G102003 1.2.1 - Cable Conduits or Ducts

All conduit, ducts and wiring shall be removed completely and shall not be abandoned in place.

G102003 1.2.2 - Piping

All piping shall be removed completely and shall not be abandoned in place, except under pavement to remain. Piping shall be filled with flowable fill under pavements to remain.

G102003 1.2.3 - Structures

Remove existing utility structures completely and do not abandon in place.

G102003 1.3 - PROTECTION OF EXISTING UTILITIES

Protect existing utilities to remain. Where removal of existing utilities and pavement is required, provide approved barricades, temporary covering of exposed areas, and temporary services or connections.

G102005 UTILITY RELOCATION

G102005 1.1 - REMOVAL AND RELOCATION OF UTILITIES

Relocate all utilities necessary to facilitate construction of the site. Replace only with new. Do not locate new buildings or structures over existing or new utilities.

G102007 SITE CLEANUP

Remove rubbish and debris from the station daily; do not allow accumulations inside or outside the building(s) or on pavements. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

G1030 SITE EARTHWORK

G1030 1.1 - GENERAL

The project includes the design and construction requirements for earthwork and grading related to construction of the building, roadway, paved area and other related sitework.

The Designer of Record shall utilize UFGS Specification Section 31 23 00.00 20, EXCAVATION AND FILL for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

G103001 GRADING

G103001 1.1 - ELEVATIONS

Establish finish floor elevations at least 6 inches above finish grade at the perimeter of new facilities, except for vehicle access ramp areas.

G103001 1.2 - SITE GRADING

The Contractor shall preserve natural topographic features to minimize the impact on the existing drainage patterns at and adjacent to the site. Provide site grading in accordance with the requirements of the UFC 3-200-10N, “Design: General Civil/Geotechnical/Landscape Requirements.”

G103001 1.3 - FINISHED SURFACES

Finish grading shall provide drainage towards new and existing drainage features. Finish grading shall not result in low spots that hold water or that direct runoff towards new or existing facilities and/or site amenities. Finish grading shall be in accordance with the requirements of the UFC 3-200-10N, “Design: General Civil/Geotechnical/Landscape Requirements.”

G103002 COMMON EXCAVATION

G103002 1.1 - COMMON EXCAVATION

The Contractor shall preserve natural topographic features to minimize cut and fill requirements. All unsuitable material and surplus excavation shall become the property of the Contractor and shall be disposed of by the Contractor legally off-Base, unless specifically directed otherwise.

G103003 ROCK EXCAVATION

G103003 1.1 - ROCK EXCAVATION

Requests for additional compensation shall not be made by the Contractor for degree of hardness or difficulty encountered in removal of material. All unsuitable material and surplus excavation shall become the property of the Contractor and shall be disposed of properly.

G103004 FILL AND BORROW

G103004 1.1 – SOURCES

Borrow and select fill shall come from off-Base sources.

G103005 COMPACTION

G103005 1.1 - COMPACTION

Provide compaction in accordance with UFGS Specification Section 31 23 00.00 20, EXCAVATION AND FILL, as applicable.

G103006 SOIL STABILIZATION

G103006 1.1 - SOIL STABILIZATION

Provide soil stabilization using geosynthetics, lime, cement, lime slurry, or asphalt designed to function as required by site conditions. Install geosynthetics in accordance with the manufacturer’s written instructions.

G103007 SLOPE STABILIZATION

G103007 1.1 - SLOPE STABILIZATION

Provide slope stabilization through appropriate grading and site design using a minimum factor of safety of 1.5 or slopes not exceeding the maximum slope per local code requirements. Where necessary, use the following techniques for slope stabilization: geogrids, gabions, riprap, or concrete. Install geogrid in accordance with the manufacturer’s written instructions.

G103008 SOIL TREATMENT

G103008 1.1 - TERMITE CONTROL

Treat the area around the entire foundation for termites in accordance with Part 5 Prescriptive Specification Section 02360, SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL.

G103008 1.2 - RODENT AND VEGETATION CONTROL

Prevent and eliminate standing water.

G103009 SHORING

G103009 1.1 - SHEETING AND SHORING

Provide sheeting, shoring, bracing, cribbing and underpinning in accordance with the Army Corps of Engineer’s Safety and Health Requirements Manual (COE EM 385-1-1), DM 7.02, “Foundations and Earth Structures”, MIL-HDBK

1007.3, “Soil Dynamics and Special Design Aspects”, UFC 3-300-10N, “Design: General Structural Requirements”, and all other applicable Federal, state, and local codes and requirements.

Provide protection of existing structures.

G103010 TEMPORARY DEWATERING

G103010 1.1 - DESIGN OF TEMPORARY DEWATERING SYSTEM

The design of the temporary dewatering system shall account for fluctuations in the groundwater elevations and the potential settlement impact on adjacent facilities due to dewatering. Provide dewatering in accordance with DM 7.02, “Foundations and Earth Structures,” MIL-HDBK 1007.3, “Soil Dynamics and Special Design Aspects.”

G103011 TEMPORARY EROSION AND SEDIMENT CONTROL

G103011 1.1 - TEMPORARY EROSION AND SEDIMENT CONTROL

Develop and implement temporary erosion and sediment control measures and other Best Management Practices (BMPs) prior to or in conjunction with commencement of earthwork in accordance with the state Erosion and Sediment Control Laws and Regulations. Remove all non-permanent erosion control measures after vegetation is fully established.

Prepare a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Part 2, Section 01575N, TEMPORARY ENVIRONMENTAL CONTROLS.

G103011 1.2 - MAINTENANCE

Maintain temporary erosion control measures in accordance with state Erosion and Sediment Control Laws and Regulations throughout the project until areas are fully stabilized. Inspect erosion control devices frequently and promptly remove sediment or debris deposits. Immediately repair damaged erosion control devices and damaged areas around and underneath the devices. Modify the erosion control plan as required to control problem areas noticed after each inspection.

G103099 OTHER SITE EARTHWORK

G103099 1.1 - HISTORIC AND ARCHAEOLOGIC ARTIFACTS

Refer to Part 2 Section 01575N, TEMPORARY ENVIRONMENTAL CONTROLS.

-- End of Section --

SECTION G20

SITE IMPROVEMENTS
07/04

G20 GENERAL

G20 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes site improvements, including roadways, parking lots, pedestrian paving, and landscaping.

G20 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB) and on the Unified Facilities Guide Specifications Web page. The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

G20 1.2.1 - Industry Standards and Codes

American Sod Producers Association (ASPA)

International Building Code (IBC)

Mississippi State Highway Specifications

G20 1.2.2 - Government Standards

CHIEF OF NAVAL OPERATIONS INSTRUCTIONS (OPNAVINSTs)

OPNAVINST 5530.14C, “Department of the Navy Physical Security”

NAVAL FACILITIES ENGINEERING COMMAND (NAVFACENGCOM)

Design Manual, DM-5.4, “Pavements”

Design Manual, DM-5.5/TM 5-822-2/AFM 88-7, “General Provisions and Geometric Design for Roads”

Military Handbook, MIL-HDBK-1013/1A “Design Guidelines for Physical Security of Facilities”

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-300-09N, “Design Procedures”

UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements”, Draft August 2004

UFC 3-260-01, “Airfield and Heliport Planning and Design”

UFC 3-800-10N, “Design: General Environmental Requirements”, Draft July 2004

UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”

UFC 4-022-03, “Security Engineering: Fences, Gates, and Guard Facilities”

UNITED FACLITIES GUIDE SPECIFICATIONS (UFGS)

32 11 26.16, “Bituminous Concrete Base Course”

32 11 16.16, “Base Course for Rigid and Subbase Course for Flexible Paving”

32 11 24, “Graded Crushed Aggregate Base Course for Flexible Pavement”

32 10 00.00 25, “Bituminous Concrete Pavement”

32 12 10, “Bituminous Tack and Prime Coats”

32 13 13.06, “Portland Cement Concrete Pavement for Roads and Site Facilities”

32 17 23.00 20, “Pavement Markings”

32 31 13.00 20, “Chain Link Fences and Gates”

U.S. DEPARTMENT OF TRANSPORTATION (USDOT)

MUTCD, “Manual on Uniform Traffic Control Devices”, 2003

G20 1.3 - GENERAL REQUIREMENTS

All work shall at a minimum comply with the publications included under paragraph “Design Guidance.”

UFC 1-300-09N, “Design Procedures”

G20 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

G20 1.4.1 - Regulatory Requirements

Provide work and materials in accordance with applicable requirements of State Highway Specifications (SHS) Mississippi Department of Transportation. Paragraphs in SHS entitled “Method of Measurement” and “Basis of Payment” shall not apply.

G20 1.4.2 - Modification of References

Where term “Engineer” is used in SHS, it shall be construed to mean Contracting Officer or Contractor’s Quality Control Representative, as appropriate. Where term “State” is used, it shall mean “Federal Government”.

G20 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, DESIGN SUBMITTAL PROCEDURES, and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES for additional requirements.

Verification of satisfactory performance shall be via Performance Verification, as detailed in this section of the RFP. Verification of satisfactory performance shall also be via testing as detailed in the paragraph, Field Quality Control, in applicable UFGS Specification Sections utilized.

G20 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES, UFC 1-300-09N, “Design Procedures”, and UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements.”

G20 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

G20 1.7 - CONSTRUCTION SUBMITTALS

Submit in accordance with Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES and the following:

SD-03 Product Data

Precast wheelstops

Irrigation system components, including piping materials and fittings, valves and accessories, sprinkler heads, backflow preventers, automatic controllers, control wiring, water hammer arrestors, water meters, rain shut-off device, freeze shut-off device, soil moisture sensor, valve boxes and lids, and all accessories.

Organic mulch

Fertilizer

Weed control fabric

Root control barrier

Antidesiccants

Fender rub strips

Cleats

SD-06 Test Reports

Joint sealer

Topsoil composition tests specified in DOA SSIR

SD-07 Certificates

Base course material

Bituminous concrete pavement

Portland cement concrete pavement

Seed and sod

Curbs and gutters

Traffic signs

Nursery certifications

Indicate names of plants in accordance with the LHBH, including type, quality, and size.

SD-08 Manufacturer's Instructions

Joint sealants

Erosion control materials

Root control barrier

Include physical characteristics, application and installation instructions, and recommendations.

SD-11 Closeout Submittals

Planting Area square footage totals for the project, calculated separately for the turf area, shrub and ground cover area, and hardscape area, so the Contracting Officer can coordinate the amendment of the Grounds Maintenance Contract, as applicable; G

G20 1.8 - ANTITERRORISM (AT) STANDARDS

Incorporate the minimum AT standards indicated in UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”; UFC 4-022-03, Security Engineering: Fencing, Gates, and Guard Facilities”; OPNAVINST 5530.14C, “Navy Physical Security”.

G2010 ROADWAYS AND HELIPAD

G2010 1.1 - PAVEMENT DESIGN

All paving shall be either bituminous concrete or portland cement concrete (PCC) pavement. Provide geometric and pavement design in accordance with UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements” and the State Department of Transportation. The design of pavements shall take into consideration the anticipated average daily traffic or daily equivalent with load repetition over the life of the project (20 years). Provide surfaces graded to drain and avoid ponding. Wherever possible, manholes, valve boxes and all other utility access structures, except drain inlets, shall be located outside of paved areas.

G2010 1.2 - PAVEMENT AESTHETICS

Provide surfaces consistent in color and finish.

G2010 1.3 - LANDSCAPING

Designs for streets and roads shall include adequate space for trees and other landscape material.

G2010 1.4 - TRAFFIC CONTROL DEVICES

New traffic control devices (i.e.; signs, markings, etc.) shall be provided and installed in accordance with the United States Department of Transportation Federal Highway Administration's "Manual on Uniform Traffic Control Devices" and their standard, “Rigid Sign Supports”. New traffic control devices shall also be provided along/in the existing streets adjacent to the project site as necessary to provide complete traffic control to the new facilities.

G2010 1.5 - EXISTING UTILITY STRUCTURES

Existing utility structures shall be adjusted to meet the new finished pavement grades as required.

G201001 BASES & SUBBASES

The Designer of Record shall utilize UFGS Specification Sections 32 11 26.16, BITUMINOUS CONCRETE BASE COURSE; 32 11 16.16, BASE COURSE FOR RIGID AND SUBBASE COURSE FOR FLEXIBLE PAVING; and 32 11 24, GRADED CRUSHED AGGREGATE BASE COURSE FOR FLEXIBLE PAVEMENT for the project specification. Submit these specifications in edited form as a part of the design submittal for the project.

G201002 CURBS & GUTTERS

G201002 1.1 - CURBS & GUTTERS

Provide concrete curbs and gutters in accordance with the SHS or as specified below, whichever is more stringent. Where the SHS do not include concrete materials for curbs, provide concrete in accordance with the applicable standard mix of the SHS for a minimum compressive strength at 28 days of 3500 psi concrete. Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 0.75 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 0.5 inch thick and spaced every 100 feet maximum unless otherwise indicated. Provide expansion joints at the end of all returns.

G201003 PAVED SURFACES

The Designer of Record shall utilize the UFGS Specification Sections 32 10 00.00 25, BITUMINOUS CONCRETE PAVEMENT; 32 12 10, BITUMINOUS TACK AND PRIME COATS; and 32 13 13.06, PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES for the project specification. Submit these specifications in edited form as a part of the design submittal for the project.

G201003 1.1 - PAVEMENT MIX

G201003 1.1.1 - Bituminous Concrete Pavement

Provide bituminous concrete pavement in accordance with the applicable standard mix of the SHS based on the pavement design and vehicle loading indicated in this RFP.

G201003 1.1.2 - Portland Cement Concrete Pavement

If reinforced, the welded wire fabric shall conform to ASTM A 185. Bar reinforcement shall conform to ASTM A 615, Grade 60.

Provide concrete in accordance with the applicable standard mix of the SHS for the design strength plus any allowable deviations.

G201003 1.2 - PAVEMENT MATERIALS

G201003 1.2.1 - Recycled Asphalt Pavement Material

Recycled asphalt pavement material may not be used.

G201003 1.3 - JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT

Joints shall be in accordance with SHS and the applicable portions of TM 5-822-5, “Pavement Design for Roads, Streets, Walks, and Open Storage Areas”. Joints shall be installed in a manner and at such time to prevent random or uncontrolled cracking. Joints shall form a regular rectangular pattern. Wherever curved pavement edges occur, make joints to intersect tangents to curve at right angles. Joints shall be in a continuous straight line extending from edge to edge of pavement. Do not stagger joints in abutting pavements. Protect joints from curing compounds by covering with tape or rope. Take necessary precautions to ensure proper curing at joints.

Deliver liquid joint sealants and lubricants in original sealed containers and protect from freezing and high temperatures. Store preformed joint fillers in a manner to maintain straightness and avoid damage. Joint preparation, primer and sealant shall be installed in accordance with manufacturer’s instructions.

G201003 1.3.1 - Expansion Joints

Provide thickened edge expansion joints at the intersection of two rigid pavements. Use preformed joint filler, ASTM D 1752, Type II or III. Filler must be compatible with joint sealer material. Preformed joint filler shall be securely held in position during concreting operations.

G201003 1.3.2 - Isolation Joints

Provide thickened edge isolation joints by placing a 1/2-inch preformed joint filler around each structure that extends into or through the pavement before concrete is placed at that location.

G201003 1.3.3 - Contraction Joints

Joint lines shall be sawed within specified tolerance, straight, and extend for width of transverse joint, and for entire length of longitudinal joint.

G201003 1.3.4 - Construction Joints

If an emergency stop occurs remove the concrete back to location of transverse joint and install a construction joint.

G201003 1.3.5 - Joint Sealants

Provide single component cold-applied silicone. Silicone sealant shall be self-leveling, non-acid curing, and meet the following requirements.

TEST	TEST METHOD	REQUIREMENTS
Weight Loss	ASTM C 792 Modified (See Note 1)	10 percent max.

Flow	ASTM C 639 (Type I)	Smooth and level
Extrusion Rate	ASTM C 603	30 sec. max.
Tack Free Time	ASTM C 679	5 hours max.
Hardness (Shore 00) (See Note 2)	ASTM C 661	30 - 80
Tensile Stress at 150 Percent Elongation (See Note 2)	ASTM D 412 (Die C)	30 psi max.
Percent Elongation (See Note 2)	ASTM D 412 (Die C)	700 min.
Accelerated Weathering	ASTM C 793	Pass 5000 hours
Bond and Movement Capability	ASTM C 719	Pass 10 cycles at ±50 percent movement (no adhesion or cohesion failure)
Flame Resistant	FS SS-S-200	Pass

NOTES:

1. Percent weight loss of wet (uncured) sample after placing in forced-draft oven maintained at 158 degrees F ± 1 degree F for two hours.

2. Specimen cured 21 days at 73 degrees F ± 1 degree F and 50 percent.

ACCELERATED WEATHERING FACTORY TEST REPORT. For Accelerated Weathering test, in lieu of testing of actual joint sealant to be used on the project, a report of a factory test, performed within two years of contract award, may be submitted.

G201003 1.3.6 - Preformed Compression Seals

ASTM D 2628. ASTM D 2835, for lubricant.

G201003 1.4 - PRIME COAT

If required, use prime coat in accordance with SHS. Prime coat shall be emulsified asphalt materials.

G201003 1.5 - TACK COAT

Tack coat is required for bituminous pavement overlays and on vertical cut faces of pavement patches. Tack coat shall be of emulsified asphalt materials.

G201003 1.6 - PAVEMENT PATCHES

Provide pavement patches for existing pavements where required for installation of utility trenches. Sawcut 12 inches beyond edge of trench. Thicknesses of pavement materials shall be equal to or greater than the existing pavement section.

G201004 MARKING & SIGNAGE

G201004 1.1 - MARKING

The Designer of Record shall utilize UFGS Specification Section

32 17 23.00 20, PAVEMENT MARKINGS for the project specification and submit these edited specifications sections as a part of a design submittal for the project. Provide a half-rate initial marking application on bituminous pavements. Provide the remaining application at the end of the normal curing period.

G201004 1.2 - SIGNAGE

Provide signage in accordance with the MUTCD.

G201005 GUARDRAILS & BARRIERS

G201005 1.1 - GUARDRAILS

Provide guard (guide) rails in accordance with the SHS. Where the SHS do not include materials for guardrails, provide guardrails in accordance with the applicable portions of the AASHTO Roadside Design Guide.

G201005 1.2 - BOLLARDS

Bollards shall be minimum 6-inch diameter steel pipe, 4 feet high, filled with concrete and embedded in a portland cement concrete foundation. Bollards shall be painted yellow unless directed otherwise.

G2020 PARKING LOTS

G202001 BASES & SUBBASES

Refer to Section G201001.

G202002 CURBS & GUTTERS

Refer to Section G201002.

G202003 PAVED SURFACES

Refer to Section G201003

G202004 MARKING & SIGNAGE

Refer to Section G201004.

Mark neatly to denote traffic lanes and parking spaces.

G202005 GUARDRAILS & BARRIERS

Refer to Section G201005.

G202005 1.1 - WHEELSTOPS

Provide precast concrete wheelstops.

G2030 PEDESTRIAN PAVING

G2030 1.1 - PEDESTRIAN PAVING

Locate new sidewalks such that they maintain continuity of pedestrian traffic to and from the existing sidewalks adjacent to the site(s).

G203003 PAVED SURFACES

G203003 1.1 - SIDEWALKS

Sidewalks shall be reinforced portland cement concrete pavement, 5 inches thick minimum. The welded wire fabric shall conform to ASTM A 185. Provide concrete in accordance with the applicable standard mix of the SHS for a minimum compressive strength at 28 days of 3500 psi concrete. Sidewalks shall be at least 5 feet wide. Use the maximum percentage of fly ash allowed in the applicable standard mix of the SHS.

Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 0.25 inch in 5 feet.

G203003 1.1.1 - Joints

Provide contraction joints spaced at intervals equivalent to the width of the sidewalk. Cut contraction joints one inch deep with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet maximum. Provide isolation joints by placing a 1/2-inch preformed expansion joint filler around each structure that extends into or through the sidewalk before concrete is placed at that location.

G203003 1.2 - HANDICAPPED RAMPS

Provide handicapped ramps of reinforced portland cement concrete pavement with a minimum compressive strength at 28 days of 3500 psi and an exposed aggregate finish at roadway intersections.

G2040 SITE DEVELOPMENT

G204001 FENCING & GATES

G204001 1.1 - CHAIN LINK FENCE

Provide polyvinyl chloride (PVC) coated over zinc-coated steel fencing components in accordance with FS RR-F-191/1, Type IV for the fencing system. PVC coating shall be green in color and a minimum thickness of 0.10 inch. Do not specify aluminum fabric, posts or accessories. Chain link fence fabric shall be at least 9 gauge steel wire mesh material (before any coating) with mesh openings not larger than 2 inches. Install fence in accordance with ASTM F 567 and the manufacturer’s written installation instructions. Fencing shall meet the requirements for security fences including UFC 4-022-03.

G204001 1.1.1 - Tension Wires

Provide top and bottom tension wires. Provide tension wire in accordance with FS RR-F-191/4, PVC over zinc-coated steel.

G204001 1.1.2 - Gates

Provide gates in accordance with FS RR-F-191/2 with posts and fabric as specified for fence.

G204001 1.1.3 - Posts and Braces

Provide posts and braces in accordance with FS RR-F-191/4, Class 1, steel pipe, Grade A. Each gate, terminal and end post shall be braced with truss rods.

G204001 1.1.4 - Fencing Accessories

Provide fencing accessories in accordance with FS RR-F-191/4 including, but not limited to caps, wire ties and clips, tension bars, truss rod, and all other miscellaneous accessories. Provide accessories with PVC color coating similar to that specified for chain-link fabric or framework.

G204001 1.2 - GROUND FENCING

Ground fencing on either side of every gate and at other locations when the fencing is near and parallel to high tension power lines. Grounding shall also be at intervals of 1000 feet to 1500 feet when the fencing runs through isolated areas and at lesser distances depending on the proximity of the fencing to public roads, highways and buildings where the fencing is around or within any explosive storage, production, operating or handling areas.

G204001 1.3 - ENCLOSURES FOR UTILITY EQUIPMENT

Where fencing is used to provide an enclosure for utility equipment, ensure that a minimum clearance of 3 feet is provided around the equipment to permit maintenance access and ventilation. Provide stone, gravel or concrete paving within the enclosure.

G204002 RETAINING WALLS

G204002 1.1 - RETAINING WALLS

Provide retaining walls to permanently resist soil pressures as well as live loads. Provide wall drainage to minimize lateral loading.

G204005 SIGNAGE

G204005 1.1 - SIGNAGE

Provide facility signage in accordance with Base signage and this RFP.

Size messages and graphics on signs according to the functional viewing distance. Typically, at least 1 inch of letter height per 25 feet of viewing distance is required for readability.

Refer to Section G201004, “Marking & Signage” for traffic signage.

G204099 OTHER SITE IMPROVEMENTS

Other site improvements shall conform to the requirements of UFC 4-010-01.

G204099 1.1 - DUMPSTER PADS

Dumpster pads shall be composed of 8 inch thick reinforced portland cement concrete pavement sized larger than what is required to accommodate the specific dumpsters to be used at the site. Consideration should be given to accessibility to the dumpster for servicing, i.e. make concrete pad large enough to accommodate the front wheels of the carrying truck. Locate in accordance with UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings.”

G204099 1.1.1 - Dumpster Enclosure

Screen trash dumpsters by providing an enclosure, which complements the adjacent facilities. Walls should be at least 6 feet tall. Where possible, orient the openings of enclosures away from building entrances and main streets.

G204099 1.1.2 - Landscaping around Dumpster Pad(s)

Place plant material in landscape beds around dumpster pad(s) to effectively screen the dumpster enclosure.

G204099 1.2 - MOORING HARDWARE ON SHEET PILE WALL

G204099 1.2.1 - Cleats

Provide 12 inch boat cleats spaced at approximately 20-foot centers along the waterfront length of the new wall. Material shall be non-corrosive, but may not be aluminum.

G204099 1.2.2 - Fender Rub Strips

Provide a synthetic extrusion of neoprene, butyl rubber or equal that is designed to be non-scuffing and provide weathering resistance, energy absorption, and damage resistance. Extrusion shall be continuous along face of wall, located to protect typical boats used by Facility from contacting the concrete wall over normal range of water levels.

G204099 1.2.3 - Attachment Hardware

All attachment hardware shall be hot-dipped galvanized steel or stainless steel (Type 316L). Galvanize steel by the hot-dip process in accordance with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable. Make threaded connections up tight and nick threads to prevent loosening. Where bolt heads may contact boats, countersink heads.

G2050 LANDSCAPING

G2050 1.1 - DESIGN

The design and installation of landscaped areas shall be in accordance with Presidential Executive Order 13148 of April 2000, except as provided by the Request for Proposal. The site design should be consistent with existing publications to address specific site concerns, development guidelines, and approved installation plant lists. Designs shall be performed by a Certified or Licensed Landscape Architect.

G2050 1.1.1 - Energy Efficiency

Reduce energy consumption to the greatest extent possible by utilizing innovative landscaping or site features including but not limited to:

a. Deciduous trees to create shade in summer and heat gain in winter.

b. Windbreaks to the north, west and east of the facility, or at a minimum provide a windbreak on the windward side of the facility at a distance from the facility of two to five times the mature height of the windbreak.

c. Shrubs and groundcover to shade the ground and pavement around the facility and reduce heat radiation.

d. Conversion of existing lawn areas to drought-tolerant ground covers, as appropriate.

G2050 1.2 - DELIVERY, STORAGE, AND HANDLING

G2050 1.2.1 - Delivery

G2050 1.2.1.1 - Branched Plant Delivery

Deliver trees with branches tied and exposed branches covered with material that allows air circulation. Prevent root ball damage and desiccation of leaves.

G2050 1.2.1.2 - Soil Amendment Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, these products may be individually furnished in bulk with a certificate indicating the above information.

G2050 1.2.1.3 - Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct plant name and size as specified in the list of required plants and attach to plants, bundles, and containers. Groups of plants may be labeled by tagging one plant. Labels shall be legible for at least 60 days after delivery to the planting site.

G2050 1.2.2 - Storage

G2050 1.2.2.1 - Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from wind and direct sunlight until planted.

b. Heel-in bare root plants.

c. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering that allows air circulation.

d. Keep plants in a moist condition until planted. Water with a fine mist spray.

e. Do not store plant material directly on concrete or bituminous surfaces.

G2050 1.2.2.2 - Seed, Fertilizer, Gypsum, pH Adjusters and Mulch Storage

Store in dry locations away from contaminants.

G2050 1.2.2.3 - Topsoil

Prior to stockpiling topsoil, eradicate, on site, undesirable growing vegetation. Clear and grub existing vegetation three to four weeks prior to stockpiling existing topsoil. New topsoil shall be a clean, friable earth material free of sticks, rock, root matter or other vegetation or deleterious material. No solid objects or material larger than ¾ inch in any dimension. The topsoil shall have no visible evidence of contaminants and shall have no unusual or objectionable odor.

G2050 1.2.3 - Handling

Do not drop or dump plants from vehicles. Avoid damaging plants at all times. Handle balled and burlapped, bare root, balled and platformed,

and container plants carefully to avoid damaging or breaking the earth ball or root structure. Do not handle plants by the trunk or stem. Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out. Remove damaged plants from the site.

G2050 1.2.3.1 - Specimen Plants

Protect against breaking soil from root area when digging, binding and wrapping or boxing specimen plants. Lightly prune plants dug and moved by portable hydraulic split shells or four-spade plant moving equipment or plants jerked bare root from the soil and treat the root system with vitamin B extract and plant hormone solution according to manufacturer's directions. Mulch and guy specimen plants in a basin and fertilize within 48 hours after removal from previous location.

G2050 1.3 - TIME RESTRICTIONS AND PLANTING CONDITIONS

G2050 1.3.1 - Planting Dates

Use planting dates that are typical in the area and that have the endorsement of the local State University or Agriculture County Extension Service as being normal practice for the geographical area.

G2050 1.3.2 - Restrictions

Do not plant when ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit

G205001 FINE GRADING AND SOIL PREPARATION

See Section G10, “Site Preparation.”

G205002 EROSION CONTROL MEASURES

See Section G10, “Site Preparation.”

G205003 TOPSOIL AND PLANTING BEDS

See paragraph titled, G205005 PLANTINGS.

G205004 SEEDING, SPRIGGING AND SODDING

Use appropriate turf species for the project area based on availability of seed or sod and anticipated project planting dates. If planting dates are unknown, provide required planting dates or alternative species for different seasons. Non-native turf shall only be utilized when used for active or passive recreation.

Areas larger than 1000 square feet should be hydroseeded. Hydroseed mix composition shall be consistent with local application rates and established practice in the project area.

G205004 1.1 - SEED

G205004 1.1.1 - Classification

Provide State-certified or State-approved seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Seeding operations shall achieve a 95% cover of the established species by the end of the maintenance period or

the area shall be reseeded in the same manner at the Contractor's expense. Seed shall be Bermuda.

G205004 1.2 - SOD

Sod shall be state certified. Sod shall have a good cover of living, growing areas. This shall be interpreted to include grass that is seasonally dormant during the normal dormant periods and capable of renewing growth after the dormant period. All sod shall be obtained from areas that are reasonable fertile and similar to soils at the project site. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable, foreign, plant material, stones, roots or other material that would be detrimental to the proper development of the sod or to the future maintenance of the sod. Sod, including the soil containing the roots and the plant growth showing above, shall be harvested and installed consistent with accepted, proven successful, local practice. Sodding operations shall achieve a 100% cover of the established species by the end of the maintenance period or the area shall be resodded in the same manner at the Contractor's expense. Sod shall be centipede.

G205005 PLANTINGS

G205005 1.1 - EXISTING SITE CONDITIONS

G205005 1.1.1 - Preserve existing trees to the greatest extent possible.

G205005 1.1.2 - Protection of existing trees to remain: Contractor shall tag trees to be saved with plastic or vinyl tape tied to the tree caliper. Contractor shall protect existing trees by fencing planting areas to remain from compaction and any other damage with barrier of metal poles a maximum 8 feet on center with plastic netting to a minimum of 10 feet radius from outside of the tree's trunk. Where tree drip lines are greater than 10 feet from the tree's trunk, locate barrier fencing at the drip line of the tree. The Contractor shall not allow debris from tree or stump removal operations to fall on or otherwise damage plants that are not scheduled for removal. Plastic tape and barrier fencing shall not be removed until planting operations are ready to begin and or instructed by the Contracting Officer.

G205005 1.1.3 - Maintenance of existing trees to remain: Existing trees that are unhealthy or that die during construction or during the landscape maintenance period, or turf, shrubs, and ground cover that are damaged or destroyed during construction operations shall be replaced by the Contractor at no additional cost to the Government. The Contractor, at the direction of the Contracting Officer, shall remove the existing tree and stump and replace it with trees of the same genus and species equal to the total caliper of the existing tree. Minimum caliper of replacement trees shall be 4-inch. Replace shrubs with 5-gallon size containers, ground cover with flat containers planted at 8-inches on center, and turf with sod, all of the same genus and species.

G205005 1.2 - UTILITIES

Trees shall not be placed within 10 feet of any above or below-grade utility line or structure.

G205005 1.3 - RECYCLING

Green waste: Contact the Public Works Center for potential green waste collection and hauling by the Government. Green waste not collected by the Government shall be separated from construction debris and delivered to the base's or local landfill's green waste recycling area. Quantify and report diverted waste to the Contracting Officer.

G205005 1.4 - PLANTING

G205005 1.4.1 – Comply with ANSI Z 60.1 and ANSI Z 133.1. Plant material shall be selected for specific applications and locations based on the following criteria:

a. Low water use and low maintenance requirements.

b. Aesthetic suitability.

c. Fire resistance based on facility location. A brush management program should be implemented for all projects in, upon, or adjoining any mountainous area or forest, and brush or grass covered land to reduce the potential for brush fire damage or destruction.

d. Function.

e. Mature size, natural form, and growth characteristics.

f. Existing adjacent project or street tree theme.

g. Soil conditions, soil percolation, and water and drainage requirements.

h. Climate zone, sun and shade requirements.

i. Public safety relating to visibility and Force Protection/Anti-terrorism requirements.

j. Energy conservation capabilities.

G205005 1.4.2 - Invasive Plants: Do not use any plant listed by the project state or region’s Exotic Pest Plant Council or State Department of Agriculture as a threat to ecosystems or agriculture.

G205005 1.4.3 - Poisonous Plants: Do not use any plant listed by the project states or region’s Exotic Pest Plant Council or State Department of Agriculture, as poisonous, in any public housing area or near play-lots or tot-lots.

G205005 1.4.4 - Soil Tests: Prior to planting design, provide a commercial soil analysis. Amend planting areas based on soil test’s interpretation and amendment type & quantity recommendations (including soil nutrients and texture, with percentages shown). Additional topsoil shall be used only in areas where soil analysis shows that the existing soil is inadequate for growth of plant materials.

G205005 1.4.5 - Edging Materials: Provide concrete, edging material around all landscape beds and individually planted specimen plants. Color shall be green.

G205005 1.4.6 - Weed Fabric: Provide a weed barrier fabric of sheet polyethelene conforming to ASTM D 2103 or other polypropylene or polyester fabric specifically designed for weed control purposes beneath all areas that do not utilize a shrub or ground cover that at maturity will cover the ground 100 percent. Cover with a minimum 3 inch depth organic mulch.

G205005 1.4.7 - Drainage: Provide for proper drainage of planting pits and bed areas due to soil conditions or water table heights that may be detrimental to the growth of the specified plant materials. Grading of turf areas and planting areas shall provide slopes that are smooth and continuous and provide positive drainage in all areas. Provide sub-surface drainage where soil or other conditions do not allow surface drainage.

G205005 1.4.8 - Maintenance: Provide a 120 day landscape maintenance period for landscaped areas within the limits of work and areas disturbed by construction. During this period, the Contractor shall weed, water, mow, edge, eradicate pests (rodents, rabbits, insects, mammals, insects, and fungus), overseed, roll, aerate, fertilize, mulch, prune, adjust guying and stakes, and assure all plant material is in a healthy and thriving condition for all newly installed and renovated landscaping or the Contractor shall replace plant material at his own expense. Contractor shall assure that hydroseed or broadcasted seed achieves 95 percent germination and is weed-free at the end of the maintenance period. Pruning shall comply with ANSI Z 133.1. Begin maintenance immediately after turf has been installed. Inspect turf areas at least once a week during the installation and establishment period and perform needed maintenance promptly. Turf shall be maintained in a manner that promotes proper health, growth, rich natural green color, and neat uniform manicured appearance, free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, roll, aerate, and perform other operations necessary to promote turf growth. Mow turf weekly during growing season.

G205005 1.4.9 - Guarantee: All trees, shrubs, ground covers and turf shall be guaranteed for a period of one year after the Contracting Officer’s final acceptance, which begins the plant establishment and maintenance period. All trees, shrubs, ground cover and vines that die or have 20% or more of their crowns that die during planting operations or the guarantee period shall be replaced with healthy plants of the same species or variety during the planting season.

G205005 1.4.10 - Final Inspection: Final inspection shall be made upon written request from the Contractor at least 10 days prior to the last day of the plant establishment period.

G205005 1.4.11 - Final Acceptance: Final acceptance shall be based on compliance with the following:

a. Plants have been accepted and required number of replacements have been installed.

b. Earth mound water basins are properly mulched and free of weeds.

c. Stakes, guys and turnbuckles are in good condition.

d. Remedial measures directed by the Contracting Officer to ensure plant materials survival and promote healthy growth have been completed.

-- End of Section --

SECTION G30

SITE CIVIL/MECHANICAL UTILITIES
07/04

G30 GENERAL

G30 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes site civil/mechanical utilities including water, sanitary sewer, storm sewer and natural gas systems.

G30 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the section text by the basic designation only. Other applicable industry standards, codes, and government standards that are referenced in the section text that are **not** found in the UMRL, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award:

G30 1.2.1 - Industry Standards and Codes

American Society of Mechanical Engineers (ASME)

International Building Code (IBC)

International Fuel Gas Code (IFC)

International Mechanical Code (IMC)

International Plumbing Code (IPC)

G30 1.2.2 - Government Standards

CHIEF OF NAVAL OPERATIONS INSTRUCTIONS (OPNAVINSTs)

OPNAVINST 5530.14C, “Department of the Navy Physical Security”

UNIFIED FACILITY CRITERIA (UFC)

UFC 1-300-09N, “Design Procedures”

UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements”

UFC 3-400-10N, “Design: General Mechanical Requirements”

UFC 3-800-10N, “Design: General Environmental Requirements”

UFC 4-010-01, “DOD Minimum Antiterrorism Standard for Buildings”

MILITARY HANDBOOK (MIL-HDBK)

Military Handbook 1005/7A “Water Supply Systems”

Military Handbook, MIL-HDBK-1013/10 “Fencing, Gates, Barriers and Guard Facilities”

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 33 11 00, “Water Distribution”

UFGS 33 11 23.00 20, “Natural Gas and Liquid Petroleum Piping”

UFGS 33 30 00, “Sanitary Sewers”

UFGS 33 34 00, “Force Mains and Inverted Siphons; Sewer”

UFGS 33 40 01, “Storm Drainage”

G30 1.3 - GENERAL REQUIREMENTS

All work shall comply with the publications included under paragraph “Design Guidance”.

G30 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

G30 1.4.1 - Materials

All materials shall be new, and shall bear the label of standardizing agency whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer’s recommendations.

G30 1.4.2 - Additional Work

Provide such other labor and materials as are required for a complete and usable system in accordance with the requirements of the criteria listed, regardless of whether such materials and associated labor are called for elsewhere in this RFP.

G30 1.4.3 - Water Distribution System Verification Testing

The Contracting Officer will conduct field inspections and witness field tests in accordance with the state waterworks regulations and as specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of AWWA C605-94 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in AWWA C605-94, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed. No leakage will be allowed at copper tubing joints (soldered, compression type, brazed) or plastic pipe joints.

For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

G30 1.4.4 - Sanitary Sewer Distribution System Verification Testing

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing.

G30 1.4.4.1 - Visual Test

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a nonpressure line for nonpressure use, test this piping as specified for nonpressure pipe.

G30 1.4.4.2 - Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. The leakage allowance is indicated in AWWA C 605 for polyvinyl chloride pipelines; and the state sewerage regulations, whichever is more stringent. When leakage or pressure drop exceeds the allowable amount, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

a. Infiltration Tests and Exfiltration Tests
Perform these tests for sewer lines made of the specified materials in accordance with ASTM C 969. Perform calculations in accordance with the Appendix to ASTM C 969.

b. Low-pressure Air Tests
Perform tests on PVC plastic pipelines in accordance with UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

G30 1.4.5 - Sanitary Sewer Manholes Verification Testing

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing.

Perform hydraulic test according to ASTM C969. Leaks and loss in test pressure constitute defects that must be repaired. Repeat testing until leakage is within allowances specified.

G30 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, DESIGN SUBMITTAL PROCEDURES, and Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES for additional requirements.

Verification of satisfactory utility system performance shall be via Performance Verification Testing, as detailed in this section of the RFP. Verification of satisfactory performance shall also be via testing as detailed in the paragraph, Field Quality Control, in applicable UFGS Specification Sections utilized.

G30 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, DESIGN SUBMITTAL PROCEDURES, UFC 1-300-03N, “Design Procedures”, UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements,” and UFC 3-400-10N, “Design: General Mechanical Requirements”.

G30 1.6.1 - Design Submittal Specification

When UFGS Specification sections are required to be used, the Designer of Record shall utilize UFGS sections for the project specifications and shall submit the edited specifications as a part of the design submittal for the project. The specifications shall (1) utilize the UFGS specification wording and requirements, (2) delete only portions of the UFGS specification that are not applicable to the project, (3) edit only the bracketed choices that are within the UFGS specification text, (4) edit blank bracketed options to include requirements that exercise prudence and adherence to acceptable industry standards, and (5) comply with the directions, directives, and requirements of all UFGS Criteria Notes. The UFGS Criteria Notes are typically bordered on the top and bottom by a line of asterisks to highlight their location.

G30 1.7 - CONSTRUCTION SUBMITTALS

Submit in accordance with Section 01332N, CONSTRUCTION SUBMITTAL PROCEDURES; Section 33 11 00 WATER DISTRIBUTION; Section 33 30 00 SANITARY SEWER; Section 33 40 01, STORM DRAINAGE; and the following:

SD-01 Preconstruction Submittals

Water System Permit; G

Pumping Stations Permit; G

Sanitary Sewer System Permit; G

SD-06 Test Reports

Water System Disinfection Test Reports; G

Hydrostatic Pressure Test Reports for Water and Sanitary Sewer Systems; G

Alignment and Leakage Test Reports for Sanitary Sewer and Storm Sewer Systems; G

SD-07 Certificates

Backflow Prevention Training Certification; G

Backflow Preventer Devices Certificate; G

SD-10 Operation and Maintenance Data

Pump Station: Data Package 3; G

G30 1.8 - COORDINATION

To the extent that site work is indicated on the RFP drawings, the Contractor shall verify that the locations and inverts of all site utility lines are coordinated with building utility lines. If necessary, the Contractor shall make adjustments to the locations and inverts indicated on the RFP drawings in accordance with applicable codes and standards.

G30 1.9 - ANTITERRORISM (AT) STANDARDS

Incorporate the minimum AT standards indicated in UFC 3-400-10N, “Design: General Mechanical Requirements”; UFC 4-010-01, “DoD Minimum Antiterrorism Standards for Buildings”; MIL-HDBK-1013/10, “Design Guidelines for Security Fencing, Gates, Barriers, and Guard Facilities”; MIL-HDBK-1013/14, “Selection and Application of Vehicle Barriers”; AND OPNAVINST 5530.14C, “Navy Physical Security Manual”.

G30 1.10 - BACKFLOW PREVENTION

The Contractor shall submit backflow prevention training certificates and backflow preventer devices certification in accordance with Section 01501N, “Temporary Facilities and Controls for Design-Build”.

G30 1.11 - EXCAVATION, BACKFILLING AND COMPACTION OF UTILITIES

Refer to Section G10, “Site Preparation”.

G30 1.12 - DELIVERY, STORAGE AND HANDLING OF MATERIALS

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, and hydrants free of dirt and debris. Handle in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench.

G3010 WATER SUPPLY

G3010 1.1 - WATER SYSTEM DESIGN

The Contractor shall determine domestic and fire demands for the facility and shall verify the design of all components of the domestic and fire protection supply systems. The water system design and construction shall be in accordance with UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements”, the state waterworks regulations, and MIL-HDBK-1005/7A (Water Supply Systems). Design the water supply systems to provide required flows and maintain residual pressures based upon peak demands.

If the new water system is an extension of an existing water system, the Contractor shall obtain all necessary static pressure, residual pressure and flow characteristics of the existing distribution system by actual field tests. The Contractor shall conduct flow and pressure tests and provide design calculations that show the existing lines are capable of handling the additional flows. The new water system shall connect to the nearest existing fitting and/or water line.

The Contractor shall design the connections to the water system including the necessary meter assemblies and backflow-preventing devices in accordance with the requirements of the Activity or utility provider and the state waterworks regulations.

The new water system for each building/facility shall be designed so water consumption for each facility is monitored from a meter dedicated to that facility. The meter shall be easily accessible, but not obvious.

Wherever possible, valve boxes and all other utility access structures shall be located out of paved areas.

G301002 POTABLE WATER DISTRIBUTION

G301002 1.1 - WATER SYSTEM DESIGN

Provide all materials, equipment, labor, testing, and miscellaneous related items to provide water distribution mains and service lines to the facility.

Available flow at the residual pressure at each point of connection shall be determined by conducting flow tests in accordance with AWWA M17 and NFPA 291.

Water main piping, service lines, fittings, valves, accessories and all other materials shall meet the American Water Works Association (AWWA) standards for a minimum system working pressure of 150 psi.

Provide blue detectable warning tape over all buried water lines. Detectable warning tape shall be acid and alkali resistant, polyethylene plastic specifically manufactured for warning and identification of buried water utilities. The tape shall be at least 3 inches wide and imprinted in bold black letters continuously over the entire length of the tape. The tape shall be manufactured with integral wires, foil backing or other means of enabling detection by a metal detector when the tape is buried up to 3 feet deep. The metallic element of the tape shall be encased in a protective jacket or other means to provide corrosion protection.

G301002 1.2 - WATER DISTRIBUTION MAINS

G301002 1.2.1 - Underground Locations

Water mains 12 inches in diameter and less shall be PVC pressure pipe (AWWA C900, Pressure Class 150, DR 18). Water mains deeper than 10 feet or larger than 12 inches in diameter shall be ductile iron pipe (AWWA C151). Fittings shall be ductile iron (AWWA C110 or AWWA C153) with rubber sealed gasket joints (AWWA C111). Piping and fittings for ductile iron pipe shall have cement-mortar lining (AWWA C104).

G301002 1.2.2 - Aboveground Locations

Water mains shall be flanged ductile iron pipe (AWWA C115). Fittings shall be ductile iron (AWWA C110 or AWWA C153) with rubber sealed gasket joints (AWWA C111). Piping and fittings for ductile iron pipe shall have cement-mortar lining (AWWA C104).

G301002 1.2.3 - Installation

Install ductile iron water mains and appurtenances in accordance with AWWA C600.

Install PVC plastic water mains and appurtenances in accordance with the requirements of AWWA C605 and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7,

"Installation." For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints.

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

G301002 1.2.4 - Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped.

G301002 1.3 - WATER SERVICE LINES

G301002 1.3.1 - Materials

Water service lines less than 4 inches in diameter shall be PVC (ASTM D1785, Schedule 80). Water service lines 4 inches and 6 inches in diameter shall be PVC pressure pipe (AWWA C900, SDR18). See G301002, Paragraph 1.2.1, “Underground Locations” for additional requirements for PVC piping.

G301002 1.3.2 - Service Connections

Connect service lines 2-inch diameter or less to the main by a corporation stop and install a gate valve on service line below the frostline. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

G301002 1.3.3 - Installation of Metallic Piping

Install pipe and fittings in accordance with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.

G301002 1.3.4 - Installation of PVC Piping

Install services lines with the applicable requirements of ASTM D 2774 and ASTM D 2855, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.

Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

G301002 1.4 - PIPING SPECIALTIES

G301002 1.4.1 - Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling

shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron or PVC plastic pipe, the middle ring shall be of cast-iron; and the follower rings shall be of malleable or ductile iron. Cast iron, ASTM A 48, not less than Class 25. Malleable and ductile iron shall, conform to ASTM A 47 and ASTM A 536, respectively. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ANSI B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be 3 for 3 inch pipe, 4 for 4 inch pipe, 5 for 6 inch pipe, 6 for 8 inch pipe, 7 for 10 inch pipe, and 8 for 12 inch and 14 inch pipe. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer.

G301002 1.5 - CORROSION PROTECTION

G301002 1.5.1 - Polyethylene Encasement

Ductile iron piping systems shall be provided with a black polyethylene encasement in accordance with AWWA C105 in order to provide exterior corrosion control for the piping system.

G301002 1.5.2 - Insulating Joints

Provide insulating joints to prevent contact between dissimilar metals at the joint between adjacent sections of piping. For ductile iron pipe, the joint shall be of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers. Gasket shall be of the dielectric type, full face, and in other respects as recommended in the Appendix to AWWA C115. Bolts and nuts shall be as recommended in the Appendix to AWWA C115. Bolts with insulating sleeves shall be full size for the bolt holes. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.

To prevent the possibility of bi-metallic corrosion, service lines of dissimilar metal to the water mains and the attendant corporation stops shall be wrapped with polyethylene or suitable dielectric tape for a minimum clear distance of 3 feet from the main.

G301002 1.6 - VALVES

G301002 1.6.1 - Installation of Valves

Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

G301002 1.6.2 - Gate Valves

G301002 1.6.2.1 - Location

Valves shall be installed at all new points of connection and where necessary to insure adequate sectionalization of the water distribution system. At a minimum, valves should be located to ensure that no more than two fire hydrants will be out of service in the event of a single break in a water main. Valves shall be located outside of pavement and heavy traffic areas whenever possible.

G301002 1.6.2.2 - Gate Valves 3-inch and Larger in Diameter

Gate valves shall be resilient-seated gate valves (AWWA C509), nonrising stem and of one manufacturer. For valve sizes larger than 20 inches provide gate valves in accordance with AWWA C500. Valves shall be the same diameter and have the same joint ends as the mains to which they are installed. Valves shall have a protective epoxy interior coating conforming to AWWA C550.

G301002 1.6.2.3 - Gate Valves Smaller than 3-inch in Diameter

Gate valves on service lines smaller than 3-inch shall conform to MSS SP-80, Class 150, solid wedge. Valves shall have flanged or threaded end connections, with a union on one side of the valve and a handwheel operator.

G301002 1.6.2.4 - Valve Box

Provide a cast iron, adjustable, valve box for each gate valve on buried piping. Valve boxes shall be of a size suitable for the valve on which it is to be used with a minimum diameter of 5.25 inches. Provide a round head and cast the word "WATER" on the lid.

G301002 1.6.3 - Check Valves

Valves sized 2-inches to 24-inches shall be swing-check type (AWWA C508) and have a protective epoxy interior coating conforming to AWWA C550.

G301002 1.6.4 - Air Release, Air/Vacuum, and Combination Air Valves

Air release, air/vacuum, and combination air valves shall be in accordance with AWWA C512 and AWWA M51.

G301002 1.6.5 - Corporation Stops

If service lines 2—inch diameter or less are tapping water mains, the corporation stops shall be ground key type, bronze, ASTM B61 or ASTM B62).

G301002 1.7 - WATER METERS

Provide displacement-type, bronze main case in accordance with AWWA C700; turbine type in accordance with AWWA C701; compound-type, bronze case in accordance with AWWA C702. Register flow in gallons. Size the meter in accordance with the following table:

Maximum Flow	Meter Size
50 gpm	1 inch
100 gpm	1.5 inches
320 gpm	2 inches
500 gpm	3 inches
1000 gpm	6 inches

Provide remote registration system meeting utility provider’s requirements. The direct-reading type system shall comply with AWWA C706. The encoder type system shall comply with AWWA C707. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.

Provide meter box and 3-valve lockable by-pass on meters to enable work on meter without shutting off building services.

G301002 1.8 - BACKFLOW PREVENTION

All backflow prevention and cross connection control devices shall be on the current list of approved devices published by the Foundation for Cross-Connection Control and Hydraulic Research and located above grade. Provide backflow prevention and cross connection control in accordance with AWWA M-14 and governing local/state plumbing codes and regulations. Provide insulated enclosure for backflow prevention devices.

G301002 1.9 - FIRE HYDRANTS

Fire hydrants shall all be of one manufacturer. Provide protection for fire hydrants located in areas subject to vehicle damage. Provide “traffic type” hydrants next to roads and parking areas. Fire hydrants shall have national standard hose threads and be yellow in color. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

G301002 1.9.1 - Dry Barrel Fire Hydrants

Dry barrel fire hydrants shall conform to AWWA C502 and shall have a 6 inch inlet, two 2.5 inch hose connections and one pumper connection sized to accommodate local fire department equipment requirements. “Traffic type” hydrants shall have frangible sections as mentioned in AWWA C502.

G301002 1.9.2 - Installation of Hydrants

Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the pumper connection facing the adjacent paved surface. If there are two, paved adjacent surfaces, contact the Contracting Officer for further direction.

G301002 1.10 - THRUST RESTRAINT

Provide adequate thrust restraints for all piping, valves and other features of the water distribution system.

Provide concrete thrust blocks (reaction backing) or restrained joints for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Restrained joints shall be in accordance with the requirements of AWWA C600 and ASTM F 1647. Based on the soil and specific project conditions, provide restrained joints along length of pipe recommended by the manufacturer.

G301002 1.11 - DISINFECTION

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with the state waterworks regulations and the applicable portions of AWWA C651, whichever method is more stringent. Obtain at least two consecutive satisfactory bacteriological

samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service.

G301004 FIRE PROTECTION WATER DISTRIBUTION

G301004 1.1 - GENERAL REQUIREMENTS

Refer to applicable portions of Section G301002 and Section D40, “Fire Protection Systems”. Water main piping, service lines, fittings, valves, accessories and all other materials shall meet the American Water Works Association (AWWA) standards for a minimum system working pressure of 200 psi.

G301004 1.2 - DETECTOR CHECKS

Provide detector check in accordance with UL 312. Detector check shall include bypass meter, piping, gate valves, check valve and connections to detector check valve. Set valve to allow minimal water flow through bypass meter when major water flow is required.

G301004 1.3 - FIRE DEPARTMENT CONNECTIONS

Provide fire department connections in accordance with UL 405.

G301004 1.4 - INDICATOR POSTS

Provide indicator posts for gate valves where required in compliance with UL789.

G3020 SANITARY SEWER

G3020 1.1 - GENERAL REQUIREMENTS

The gravity sanitary sewage collection system shall be designed and constructed in accordance with UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements”, the state sewer collection and treatment regulations. The new sanitary sewage collection system shall connect to the nearest existing sanitary manholes and/or sanitary lines adjacent to the project site. The Contractor shall provide design calculations that show the existing system capable of handling the additional flows.

Pump stations and force mains shall only be used when absolutely necessary. In areas where chemicals and other substances may be stored (including mechanical and electrical rooms), it is recommended that the floor drains be eliminated or provisions made to prevent spills from entering the sanitary sewer systems. If there is process flow from equipment, discharge can be hard piped, with air gap, to the sanitary sewer.

Wherever possible, manholes and all other utility access structures shall be located out of paved areas.

Provide a green detectable warning tape over all buried sewer lines. Detectable warning tape shall be acid and alkali resistant, polyethylene plastic specifically manufactured for warning and identification of buried potable water utilities. The tape shall be at least 3 inches wide and imprinted in bold black letters continuously over the entire length of the tape. The tape shall be manufactured with integral wires, foil backing or other means of enabling detection by a metal detector when the tape is buried up to 3 feet deep. The metallic element of the tape shall be encased in a protective jacket or other means to provide corrosion protection.

G302001 SANITARY SEWER PIPING

G302001 1.1 - GENERAL REQUIREMENTS

Provide all materials, equipment, labor, testing, and miscellaneous related items to provide sanitary sewage lines necessary for distribution and services to the buildings.

G302001 1.2 - GRAVITY SEWER PIPING

G302001 1.2.1 - Materials

Gravity sewer mains and laterals shall be PVC sewer pipe and fittings (ASTM D 3034, SDR 35 or ASTM F 949 with end suitable for elastomeric gasket joints). Joints shall conform to ASTM D 3212 and gaskets to ASTM F 477. Provide ductile iron pipe (ASTM A 746) for pipes under roadways or at depths greater than 10 feet. Provide required Thickness Class based on design information and methods in ASTM A 746. Fittings for ductile iron pipe shall be ductile iron (AWWA C110 or AWWA C153). Pipe and fitting shall have push-on joints or mechanical joints. Piping and fittings for ductile iron pipe shall have a cement-mortar lining (AWWA C104).

G302001 1.2.2 - Branch Connections

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

G302001 1.2.3 - Connections to Existing Lines

Obtain approval from the Contracting Officer before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

Cutting into piping for connections shall not be done except in special approved cases. When the connecting pipe cannot be adequately supported on undisturbed earth or tamped backfill, the pipe shall be encased in concrete backfill or supported on a concrete cradle as directed. Concrete required because of conditions resulting from faulty construction methods or negligence by the Contractor shall be installed at no additional cost to the Government. The installation of wye branches in an existing sewer shall be made by a method which does not damage the integrity of the existing sewer. One acceptable method consists of removing one pipe section, breaking off the upper half of the bell of the next lower section and half of the running bell of wye section. After placing the new section, it shall be rotated so that the broken half of the bell will be at the bottom. The two joints shall then be made with joint packing and cement mortar.

G302001 1.2.4 - Installation

Install PVC sewer piping and fittings in accordance with ASTM D 2321. Do not use ASTM D 2321 Class IV or V materials for bedding, haunching or initial backfill materials.

Install ductile iron pipe and associated fittings in accordance with the requirements of AWWA C600 for pipe installation and joint assembly. Also assemble mechanical-joints with the recommendations of Appendix A to AWWA C111.

G302001 1.3 - PIPING FOR CLEANOUTS

G302001 1.3.1 - Cast-Iron Hub and Spigot Soil Pipe and Fittings

ASTM A 74, service, with ASTM C 564 compression-type rubber gaskets.

G302001 1.3.2 – Installation

Install cast iron pipe and fittings in accordance with the recommendations of the pipe manufacturer. Make joints with the rubber gaskets specified for cast iron soil pipe joints and assemble in accordance with the recommendations of the pipe manufacturer.

G302001 1.4 - CORROSION PROTECTION

Cast iron soil pipe and ductile iron piping shall be wrapped in polyethylene tubing (AWWA C105, Class A or Class C).

G302002 SANITARY SEWER MANHOLES & CLEANOUTS

G302002 1.1 - GENERAL REQUIREMENTS

Provide all materials, equipment, labor, testing, and miscellaneous related items for the sanitary manholes in accordance with the following:

a. Manhole rim elevations shall be set flush with finished surface of paved areas or 1 inch above finished grade in unpaved areas.

b. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990. For cast-in-place concrete manholes, pipe-to-wall connections shall be mortared to produce smooth transitions and watertight joints.

c. Provide drop manholes when a gravity sewer pipe enters a manhole at an elevation of 24 inches or more above the manhole invert.

G302002 1.2 - PRECAST CONCRETE MANHOLES

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478; base and first riser shall be monolithic. Pre-cast manhole sections shall have O-ring joints or joints with gaskets conforming to ASTM C 443.

G302002 1.3 - CAST-IN-PLACE CONCRETE MANHOLES

Cast-in-place units shall conform to ASTM C478/478M where feasible. Cement mortar shall conform to ASTM C 270, Type M with Type II cement.

G302002 1.3.1 - Portland Cement

Portland cement shall conform to ASTM C 150, Type II for concrete used in concrete pipe, concrete pipe fittings, and manholes and type optional with the Contractor for cement used in concrete cradle, concrete encasement, and thrust blocking. Where aggregates are alkali reactive, as determined by Appendix XI of ASTM C 33, a cement containing less than 0.60 percent alkalies shall be used.

G302002 1.3.2 - Portland Cement Concrete

Portland cement concrete shall conform to ASTM C 94, compressive strength of 4000 psi at 28 days, except for concrete cradle and encasement or concrete blocks for manholes. Concrete used for cradle and encasement shall have a compressive strength of 2500 psi minimum at 28 days. Concrete in place shall be protected from freezing and moisture loss for 7 days.

G302002 1.4 - MANHOLE FRAMES AND COVERS

FS A-A-60005. Frames and covers shall be cast iron or ductile iron; frames and covers shall be designed to accommodate the traffic loadings. The frames and covers shall have a combined weight of not less than 400 pounds. The word "Sewer" shall be stamped or cast into covers so that it is plainly visible.

G302002 1.5 - MANHOLE STEPS

Zinc-coated steel conforming to 29 CFR 1910.27. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

G302002 1.6 - MANHOLE LADDERS

A steel ladder shall be provided where the depth of a manhole exceeds 12 feet. The ladder shall not be less than 16 inches in width, with ¾ inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123.

G302002 1.7 - MANHOLE CONSTRUCTION

Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.

G302002 1.7.1 - Precast Concrete Manholes

Construct base slab of precast concrete base sections. Make inverts in precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. Make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required.

G302002 1.7.2 - Cast-in-Place Concrete Manholes

Construct base slab of cast-in-place concrete. Make inverts in cast-in-place concrete with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. No parging will be permitted on interior manhole walls.

G302002 1.8 - CONNECTIONS TO EXISTING MANHOLES

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar

around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

G302002 1.9 - CLEANOUTS

Unless otherwise indicated, construct cleanouts of cast iron soil pipe and fittings.

G302003 LIFT STATIONS AND PUMPING STATIONS

G302003 1.1 - GENERAL REQUIREMENTS

Provide all materials, equipment, labor, testing and miscellaneous related items for a packaged lift or pump station system for the facility in compliance with the UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements” and the state sewer collection and treatment regulations.

G302003 1.2 - SUBMERSIBLE PUMPS

Pumps handling raw wastewater shall be capable of passing spheres of at least 3 inches in diameter. The pump’s suction and discharge openings shall be at least 4 inches in diameter.

Provide submersible type sewage pumps, with guide system. Include ASTM A48, Class 25, nonclog, cast-iron impeller; and hermetically sealed motor with moisture-sensing probe, mechanical seals, and waterproof power cable. Guide system shall be constructed of stainless steel. Provide a stainless steel lifting chain for raising and lowering the pump in the basin.

G302003 1.3 - GRINDER PUMPS

Provide grinder-type sewage pumps, with guide system. Include stainless steel or bronze impeller and hermetically sealed motor with moisture-sensing probe, mechanical seals, and waterproof power cable. Guide system shall be constructed of stainless steel. Provide a stainless steel lifting chain for raising and lowering the pump in the basin.

G302003 1.4 - PUMP MOTOR

Provide pump motor sized to accommodate pump operation along the entire impeller curve.

G302003 1.5 - STATION PIPING WITHIN WET WELL AND VALVE VAULT

G302003 1.5.1 - Piping Less than 4-Inch in Diameter

Station piping less than 4 inches in diameter shall be PVC pressure pipe, couplings and fittings (ASTM D1784, Class 12454-B).

For screw joints, use pipe conforming to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Use threaded pipe fittings conforming to requirements of ASTM D 2464, threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings. Test pipe couplings when used, as required by ASTM D 2464.

For push-on joints, ASTM D 3139, with ASTM F 477 gaskets. Fittings for push-on joints: AWWA C110 or AWWA C111, cement-mortar lined (standard thickness) in accordance with AWWA C104.

G302003 1.5.2 - Piping 4-inch Diameter and Larger

For station piping 4-inch diameter and larger, use flanged ductile iron pipe (AWWA C115). Use fittings with pressure rating at least equivalent to that of the pipe.

G302003 1.6 - FORCE MAINS

G302003 1.6.1 - Force Mains for Submersible Pumps

Force mains shall be at least 4 inches in diameter and shall be either ductile iron pipe (AWWA C151) or PVC pressure pipe (AWWA C900, Pressure Class 150). Fittings for force main piping shall be AWWA C110 or AWWA C153. Piping and fittings for ductile iron pipe shall have cement-mortar lining conforming to AWWA C104, standard thickness. Solvent welded joints shall not be used on force mains.

G302003 1.6.2 - Force Mains for Grinder Pumps

Force mains less than 4 inches in diameter shall be PVC pressure pipe, couplings and fittings (ASTM D1784, Class 12454-B).

For screw joints, use pipe conforming to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Use threaded pipe fittings conforming to requirements of ASTM D 2464, threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings. Test pipe couplings when used, as required by ASTM D 2464.

For push-on joints, ASTM D 3139, with ASTM F 477 gaskets. Fittings for push-on joints: AWWA C110 or AWWA C111, cement-mortar lined (standard thickness) in accordance with AWWA C104.

G302003 1.7 - PIPING ACCESSORIES

G302003 1.7.1 - Insulating Joints

Provide between pipes of dissimilar metals a rubber gasket or other approved type of insulating joint or dielectric coupling to effectively prevent metal-to-metal contact between adjacent sections of piping.

G302003 1.7.2 - Accessories

Provide flanges, connecting pieces, transition glands, transition sleeves, and other adapters as required.

G302003 1.7.3 - Flexible Flanged Coupling

Provide flexible flanged coupling applicable for sewage as indicated. Use flexible flanged coupling designed for a working pressure of 350 psi.

G302003 1.8 - VALVES

Suitable shutoff and check valves shall be provided on the discharge line of each pump. Locate the check valve between the shutoff valve and the pump. Locate valves in accordance with state sewerage regulations. Check valves shall be suitable for the material being handled and placed on the horizontal portion of the discharge piping except for ball check valves, which may be placed in the vertical run. Valves shall be capable of withstanding normal pressure and water hammer.

G302003 1.8.1 - Shut Off Valves

G302003 1.8.1.1 - Shut Off Valves Less than 4-Inch in Diameter

For shut off valves with diameters less than 4 inch, use PVC ball valves.

G302003 1.8.1.2 - Shut Off Valves 4-Inch and Larger in Diameter

For shut off valves 4-inch diameter and larger, use gate valves conforming to AWWA C509, nonrising stem, and flanged. Provide valves with handwheels that open by counterclockwise rotation of the valve stem. Bolt and construct stuffing boxes to permit easy removal of parts for repair. Use valves from one manufacturer. Provide epoxy coating in accordance with AWWA C550.

G302003 1.8.2 - Check Valves

G302003 1.8.2.1 - Check Valves Less than 4-Inch in Diameter

For check valves for diameters less than 4 inch, use neoprene ball check valve with integral hydraulic sealing flange, designed for a hydraulic working pressure of 175 psi.

G302003 1.8.2.2 - Check Valves 4-Inch and Larger in Diameter

For check valves 4-inch diameter and larger, use check valves conforming to AWWA C508 and flanged. Provide a nonclog, swing check valve rated for not less than 175 psig working pressure capable of passing 3-inch diameter solids.

G302003 1.8.3 - Air Relief Valves

Provide air relief valves at high points in the force main to prevent air locking in accordance with AWWA M51. Provide vacuum relief valves, where required, to relieve negative pressures on force mains.

G302003 1.9 - IDENTIFICATION TAGS AND PLATES

Provide valves with tags or plates numbered and stamped for their usage. Use plates and tags of brass or nonferrous material and mounted or attached to the valve.

G302003 1.10 - THRUST RESTRAINT

Provide adequate thrust restraints for force mains, valves and other features of the wastewater distribution system.

Provide concrete thrust blocks (reaction backing) or restrained joints for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Restrained joints shall be in accordance with the requirements of AWWA C600 and ASTM F 1647. Based on the soil and specific project conditions, provide restrained joints along length of pipe recommended by the manufacturer.

G302003 1.11 - STATION CONTROL SYSTEM

G302003 1.11.1 - Operating Controls

Provide automatic level control by floats or pressure transducer in accordance with the preferences of the system owner to fill and prevent overflow of the wet well. Provide reliable, continuous operation of the

station through emergency pumping capability; provide either electrical connections for a portable emergency generator hook-up or an emergency generator sized to start up and maintain the total rated running capacity of the station, including the pumps, controls, lighting, ventilation and other auxiliary equipment.

G302003 1.11.2 - Alarm Controls

Audio-visual alarm systems shall be provided for all pumping and lift stations in accordance with the state sewerage collection and treatment regulations and the preferences of the system owner. At a minimum the alarm shall be activated in case of high level, power failure, pump failure, unauthorized entry or any cause of station malfunction. Provide alarms as required by the pump manufacturer to obtain warranty.

G302003 1.11.3 - Telemetry

If required, provide a telemetry system in accordance with state sewer collection and treatment regulations and system owner’s requirements to relay alarms to a facility that is manned 24 hours a day.

G302003 1.12 - UNDERGROUND ENCLOSURES

Provide pump station wet well of precast concrete or fiberglass construction. Provide adjacent valve vault of precast concrete or fiberglass construction.

G302003 1.13 - STATION ACCESSORIES

G302003 1.13.1 - Ventilation

Covered wet wells shall have provisions for air displacement venting to the outside. Galvanized ASTM A 53/A 53M pipe with insect screening.

Provide adequate ventilation for all pump stations.

G302003 1.13.2 - Metering

Provide devices for measuring wastewater flow at all pumping stations. Provide indicating, totalizing and recording flow measurement at pumping stations with a 1200 gpm or greater design peak hourly flow. For smaller stations, provide elapsed time meters in conjunction with pumping rate tests.

G302003 1.13.3 - Pipe and Valve Supports

Use schedule 40 galvanized steel piping conforming to ASTM A 53/A 53M for pipe and valve supports. Provide either ANSI B16.3 or ANSI B16.11 galvanized threaded fittings.

G302003 1.13.4 - Miscellaneous Metals

Use stainless steel bolts, nuts, washers, anchors, and supports for installation of equipment.

G302003 1.14 - CORROSION PROTECTION

Ductile iron piping shall be wrapped in polyethylene tubing in accordance with AWWA C105, Class A or Class C.

G302003 1.15 - FIELD TESTS AND INSPECTIONS

Design and test pressure sewers for hydrostatic pressures 50 psi above the surge rate for the pumps feeding the line, or 150 psi, whichever is greater.

G3030 STORM SEWER

The Designer of Record shall utilize UFGS Specification Section 33 40 01, STORM DRAINAGE for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

Provide all materials, equipment, labor, testing, and miscellaneous related items to provide storm drainage collection system necessary to drain the site. The storm sewer collection system shall be designed and constructed in accordance with UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements” and the state Stormwater Management Laws and Regulations.

G303001 STORM SEWER PIPING

Refer to UFGS Specification Section 33 40 01, STORM DRAINAGE.

G303002 STORM SEWER STRUCTURES

Refer to UFGS Specification Section 33 40 01, STORM DRAINAGE.

G303004 CULVERTS

Refer to UFGS Specification Section 33 40 01, STORM DRAINAGE.

G303005 HEADWALLS

Refer to UFGS Specification Section 33 40 01, STORM DRAINAGE.

G303006 EROSION & SEDIMENT CONTROL MEASURES

Refer to Section G103011.

G303007 STORMWATER MANAGEMENT

G303007 1.1 - STORMWATER COLLECTION AND STORAGE

Provide permanent detention/retention ponds and other drainage features to regulate stormwater runoff and to prevent damage to the site and off-site. Integrate permanent storm water management ponds, swales, etc., into the total site design to provide an aesthetically pleasing and harmonious landscape. Develop and construct the ponds and other drainage features in accordance with UFC 3-200-10N, “Design: General Civil/ Geotechnical/ Landscape Requirements” and the State Stormwater Management Laws and Regulations.

G3060 FUEL DISTRIBUTION

G306005 GAS DISTRIBUTION PIPING (NATURAL GAS)

G306005 1.1 - STEEL PIPE

Gas piping shall be ASTM A 53, Type E (electric-resistance welded, Grade A or B) or Type S (seamless, Grade A or B), black steel or API SPEC 5L, seamless, submerged-arc weld or gas metal-arc weld, Grade B, black steel. Provide Weight Class STD (Standard) for welding end connections. Provide Weight Class XS (Extra Strong) for threaded end connections.

G306005 1.2 - REINFORCED THERMOSETTING EPOXY RESIN (RTR)

RTR plastic pipe and fittings shall conform to ASTM D 2517 and have adhesive joints.

G306005 1.3 - POLYETHYLENE (PE)

PE pipe and heat fusion fittings shall conform to ASTM D 2513, Grade PE2406 or PE3408.

G306005 1.4 - WARNING & IDENTIFICATION TAPE

Provide detectable aluminum foil, plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identifying buried piping.

--End of Section--

SECTION G40

SITE ELECTRICAL UTILITIES
09/03

G40 GENERAL

G40 1.1 - NARRATIVE

This section must be used in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

Provide a complete primary and secondary site electrical system consisting of Pad Mounted Transformers, Metering, Underground Distribution, Overhead Distribution, Site Lighting, Security Lighting, Site Communications and Security, and Grounding including accessories and devices as necessary and required for a complete and usable system.

This section covers installations exterior to the facility up to the five foot line. See Section D50 “Electrical” for continuation of systems into the building.

This is a general section. Not all items in this section will be required for this project. See Project Program section ESR G40 for project specific requirements.

G40 1.2 - DESIGN GUIDANCE

This specification section references published standards, the titles of which can be found in the Unified Master Reference List (UMRL) in the Construction Criteria Base (CCB). The publications referenced form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Comply with the required and advisory portions of the current edition of the standard at the time of contract award.

When use of UFGS Specifications is required, the Designer of Record shall edit portions of the Specification if there is a bracketed option available within the Specification text. Comply with all non-bracketed portions unless they do not pertain to the designed system or products. Where bracketed items include a blank option to be filled in by the Designer of Record, such as a number of tests required per amount of work performed, the Designer of Record shall exercise prudence and adhere to acceptable industry standards. Comply with the directions, directives and requirements of all of the Specification Criteria Notes.

G40 1.2.1 - Industry Codes and Standards

Adhere to applicable Industry Codes and Standards.

G40 1.2.2 - Government Standards

UNITED FACILITIES CRITERIA (UFC)

UFC 3-501-03N “Electrical Engineering Preliminary Design Considerations”

UFC 3-550-03N “Power Distribution Systems”

UFC 3-560-10N “Safety of Electrical Transmission and Distribution Systems”

UFC 3-580-10 “Navy and Marine Corp Intranet (NMCI) Standard Construction Practices”

UFC 4-010-01 "DoD Minimum Antiterrorism Standard for Buildings"

UFC 4-021-01 "Design and O & M: Mass Notification Systems (MNS)"

UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

UFGS 26 12 19.10 “Three-Phase Pad Mounted Transformers”

UFGS 26 12 19.20 “Single-Phase Pad Mounted Transformers”

UFGS 33 71 01.00 20 “Overhead Transmission and Distribution”

G40 1.3 - GENERAL REQUIREMENTS

All work shall comply with the following design standards as a minimum:

UFC 1-300-09N “Design Procedures”

UFC 3-501-03N “Electrical Engineering Preliminary Design Considerations”

UFC 3-550-03N “Power Distribution Systems”

UFC 3-560-10N “Safety of Electrical Transmission and Distribution Systems”

UFC 3-580-10 “Navy and Marine Corp Intranet (NMCI) Standard Construction Practices”

UFC 3-800-10N “Design: General Environmental Requirements”

UFC 4-010-01 “DoD Minimum Antiterrorism Standard for Buildings”

UFC 4-021-01 “Design and O & M: Mass Notification Systems (MNS)”

G40 1.4 - QUALITY ASSURANCE

Materials and assemblies installed in the work shall be inspected and found to be in compliance with industry standards and these specifications prior to acceptance of the work. Items found not to be in compliance shall be removed, or corrective measures taken, to assure compliance with the referenced standard.

Qualifications, Training Plans, and Test Plans and Procedures indicated herein, shall be submitted 45 calendar days prior to the expected date of execution. Notify the Contracting Officer 14 calendar days prior to all testing. Submit test results within 7 calendar days of completion of testing.

G40 1.4.1 - Qualified Workers

Use qualified workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.

G40 1.4.1.1 - Qualified Testing Organization

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and

installer of the equipment. The organization shall be a first tier subcontractor.

a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.

b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

G40 1.4.1.2 - NEC Qualified Worker

In accordance with NFPA 70, the ratio of helpers to qualified workers shall be no greater than 1 to 1. Helpers must be registered in recognized apprenticeship programs.

G40 1.4.1.3 - Qualified Medium Voltage Electrician

All workers on medium voltage electrical crews shall have 5 years experience working medium voltage systems on similar projects involving the same or higher voltage.

G40 1.4.1.4 - Qualified Cable Splicer (Medium Voltage Cable)

Certification shall include the training, and experience of the individual on specific type and classification of medium voltage cable to be provided under this contract.

In order to establish the cable splicer’s competency, the Contractor shall be required to submit the following 30 calendar days prior to commencement of the splice/termination:

a. Documentation to verify that the individual has completed a splice and or termination of the type to be installed under this contract.

b. Documentation that said splice/termination has been tested and passed in accordance with NETA ATS requirements. Test results shall be included.

c. A statement of the number of years in which the individual has been splicing/terminating medium voltage cable.

G40 1.4.1.5 - Qualified Cable Splicer (Telecommunications)

Certification shall include the training, and experience of the individual on specific type and classification of telecommunications cable to be provided under this contract.

G40 1.4.1.6 - Qualified Cable Installer and Splicer (Fiber Optic Cable)

Certification shall include the training, and experience of the individual on specific type and classification of Fiber Optic media to be provided under this contract.

G40 1.4.1.7 - Qualified Fiber Optic (FO) Cable Manufacturer

The FO media manufacturer shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of FO media that complies with RUS REA Bull 1753F-601 (PE-90). Manufacturer shall provide a list of customers with 3 years of maintenance logs documenting experience with government customers.

G40 1.4.2 - Material Standards

Materials, equipment, fixtures, and other appurtenances shall comply with applicable Underwriters Laboratories, (UL) Inc., American National Standards Institute, Inc., and National Electrical Manufacturer’s Association standards or applicable standards of a similar independent testing organization. All materials shall be new, and shall bear the label of Underwriters Laboratories whenever standards have been established and label service is normally and regularly furnished by the agency. All equipment provided shall be listed and labeled suitable for the specified purpose, environment, and application and installed in accordance with manufacturer’s recommendations.

G40 1.4.2.1 - Service Support

The equipment items shall be supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

G40 1.4.2.2 - Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place, the nameplate of the distributing agent will not be acceptable.

G40 1.4.3 - Factory Testing

The Government reserves the right to witness all factory testing. The manufacturer shall have a calibration program that assures that all applicable test instruments are maintained within rated accuracy.

G40 1.4.4 - Electrical System Startup and Testing

Design submittal specifications shall include testing and training recommendations for government approval. Those recommendations shall be tailored to the systems provided. The test plan shall list make and model and provide functional description of the test instruments and accessories and shall describe the setup of the tests to be conducted. Provide test instruments capable of measuring and recording or displaying test data at a higher resolution and greater accuracy than specified for the equipment’s performance.

G40 1.4.4.1 - Factory Trained Engineer

Provide a factory-trained engineer to supervise start-up and testing for Switchgear and Transformers.

G40 1.4.4.2 - Performance Verification Testing

The Government reserves the right to witness all Performance Verification Tests, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements. The Contractor shall show by demonstration in service that all circuits and devices are in operating condition. Tests shall be such that each item of control equipment will function not less than five times. The Contractor shall provide all necessary test equipment, tools, fuel, load banks, etc., labor, and materials for testing. As a minimum, all systems shall be tested in accordance with manufacturer's recommendations. Additional testing requirements for the various systems are described with those systems, hereinafter. The Contractor shall assure that all applicable test instruments are maintained within rated accuracy. Dated calibration labels shall be visible on all test equipment.

Submit a separate electrical field test plan in accordance with manufacturer's recommendations and that conforms to NETA ATS for each piece of Electrical Distribution Equipment and/or System requiring Performance Verification Testing.

G40 1.4.4.3 - Acceptance Tests and Inspections

The Government reserves the right to witness all Acceptance Tests and Inspections, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements.

The Qualified Testing Organization shall provide the Acceptance Tests and Inspections test plan and procedures and perform the acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Perform acceptance tests and inspections on Switchgears and Transformers.

G40 1.4.5 - Training

After installation of the equipment and systems, provide individual training courses for two Government personnel for each of the items listed below, covering items contained in the Operations and Maintenance manuals. Provide one copy of the Operations and Maintenance manuals for each attendees. Provide one DVD disc of the training courses to be used as refresher courses and to train additional personnel. The same factory trained engineer that supervised installation of the systems indicated shall conduct training. Training shall include classroom discussion as well as hands on maintenance, replacement of typical components and repair type maintenance training for parts typically replaced or repaired in the field. Training plan shall include scheduling, content, outline, and training material handouts. Provide training for the following:

1. Transformers – 8 hours

G40 1.5 - COMPLIANCE VERIFICATION

Compliance with the requirements will be determined by a review of the design and construction submittals and by field inspection. See Section 01331N, “Design Submittal Procedures”, and Section 01332N, “Construction Submittal Procedures” for additional requirements.

Verification of satisfactory electrical system performance shall be via “Performance Verification Testing” and “Acceptance Tests and Inspections”.

G40 1.6 - DESIGN SUBMITTALS

Design submittals shall be in accordance with Section 01331N, “Design Submittal Procedures”, UFC 1-300-09N, “Design Procedures”, UFC 3-500-10N, “Design: General Electrical Requirements”.

G40 1.7 - CONSTRUCTION SUBMITTALS

Submit the following in accordance with Section 01332N, “Construction Submittal Procedures”:

SD-02 Shop Drawings

Underground Structures

Fiber Optic and Copper Cable System

Site Lighting

SD-03 Product Data

Cable Systems

Underground Structures

Lighting Systems

SD-06 Test Reports

Performance Verification Test Reports; G

Acceptance Tests and Inspections Test Reports; G

SD-07 Certificates

Training Plan; G

Performance Verification Test Plan and Procedures; G

Qualifications of Testing Organization and Engineering Technician; G

Acceptance Tests and Inspections Procedure; G

Worker Qualifications; G

Manufacturer Qualifications; G

SD-08 Manufacturer’s Instructions

Fiber Optic Systems Instructions; G

SD-09 Manufacturer’s Field Reports

Factory Reel Tests For Fiber Optic Cables; G

Test Data For Luminaires; G

Fiberglass Pole Test Reports; G

G4010 ELECTRICAL DISTRIBUTION

The Designer of Record shall determine electrical characteristics.

G401002 TRANSFORMERS

When transformers are required, the Designer of Record shall utilize UFGS Specification Section 26 12 19.10 “Three-Phase Pad Mounted Transformers”, UFGS Specification Section 26 12 19.20 “Single-Phase Pad Mounted Transformers”, or UFGS Specification Section 33 71 01.00 20 “Overhead Transmission and Distribution” for the project specification, and shall submit the edited specification section as a part of the design submittal for the project.

G401004 OVERHEAD ELECTRIC CONDUCTORS

Provide overhead wiring in accordance with UFC 3-500-10N and local power line standards. Power line conductors shall be strung in accordance with standard sag and tension charts and no conductor shall be pre-stressed beyond that required by customary practice. Sagging shall not be done during periods of high wind.

G401005 TOWERS, POLES, CROSSARMS AND INSULATORS

Wood poles shall comply with ANSI 05.1 and RUS 1728F-700 and be pressure treated in accordance with AWPA C1 and AWPA C4 as referenced in RUS 1728F-700. The quality of each pole shall be ensured with “WQC” (wood quality control) brand on each piece or by an approved inspection agency report. Do not use creosote treated poles, lodgepole pine, and western larch pine poles.

Concrete poles shall comply ANSI loadings for distribution poles.

The size of poles required, class, height and other data, shall be determined by the designer of record to meet requirements of the pole line. Cross-arms shall be steel in accordance with industry and local standards. Insulators, cutouts and associated equipment shall be determined by the Designer of Record to meet system requirements.

G401006 UNDERGROUND ELECTRIC CONDUCTORS

Underground conductors shall be in accordance with UFC 3-500-10N. Route underground cables to minimize splices. Cable pulling tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Medium voltage cable termination shall be suitable for the location installed and meet IEEE Std. 48 Class 1 requirements.

G401006 1.1 - PERFORMANCE VERIFICATION TEST

Test cable in accordance with the manufacturer's recommendations, NETA ATS, and ANSI standards. Adhere to precautions and limits as specified in the applicable NEMA/ICEA Standard for the specific cable.

G401007 DUCTBANKS, MANHOLES, HANDHOLES AND RACEWAYS

Underground structures shall be in accordance with UFC 3-500-10N. Concrete manholes and handholes shall be standard type pre-cast concrete. Composite/Fiberglass handholes shall be polymer concrete reinforced with a heavy weave fiberglass reinforcing as indicated. Load ratings of manholes and handholes shall be suitable for the location installed.

G401008 GROUNDING SYSTEMS

Electrical distribution grounding shall be in accordance with UFC 3-500-10N.

G401008 1.1 - PERFORMANCE VERIFICATION TESTING

Test electrical distribution ground systems in accordance with the manufacturer's recommendations, NETA ATS, and ANSI standards.

G401009 METERING

Provide metering in accordance with UFC 3-500-10N.

G4020 SITE LIGHTING

Exterior site lighting shall be in accordance with UFC 3-500-10N.

G402003 TOWERS, POLES, CROSSARMS AND INSULATORS

Poles shall meet Uniform Building Code for street lighting poles, and AASHTO loadings for highway and sports lighting poles taking into account the effective projected areas of the luminaries provided. Poles shall be direct set or anchor-base type designed for use with underground supply conductors. Poles, mounting brackets, and foundations shall be in accordance with UFC 3-500-10N.

G402004 UNDERGROUND ELECTRIC CONDUCTORS

Provide in accordance with Paragraph G401006.

G402005 DUCTBANKS, MANHOLES AND HANDHOLES

Handholes and underground conduits for site lighting shall be in accordance with Paragraph G401007.

G402006 EXTERIOR LIGHTING FIXTURES AND CONTROLS

Exterior lighting shall be in accordance with UFC 3-500-10N. Maintained mean area lighting levels shall be 6 lux (0.5 fc). Lighting uniformity shall be maintained with the following average to minimum (avg/min) uniformity ratios:

1. Highway Lighting, 3:1
2. Secondary Street Lighting, 6:1
3. Area And Parking Lighting, 6:1

G402006 1.1 - PERFORMANCE VERIFICATION TEST

Contractor’s Quality Control (CQC) representative shall perform a field survey of the exterior lighting systems in accordance with IESNA for acceptance. Show that the lighting system operates in accordance with the user’s requirements and is in accordance with designed levels. Designer of Record shall provide a copy of initial calculations to verify values are in compliance.

G402007 GROUNDING SYSTEMS

Site Lighting grounding systems shall be in accordance with NFPA 70.

G402007 1.1 - PERFORMANCE VERIFICATION TESTS

Test in accordance with paragraph G401008.

G4030 SITE COMMUNICATION AND ELECTRONIC SECURITY SYSTEMS

Provide wiring from the point of connection to the point of entrance of the facility to serve voice, data and security systems in accordance with UFC 3-500-10N. Installation methods shall be consistent with power wiring methods.

G403001 TELECOMMUNICATIONS SYSTEMS

Provide copper and fiber cabling to serve the facility systems. Provide a system of distribution frames in the main telecommunications equipment room to terminate all exterior site telecommunications cables.

G403003 FIRE ALARM SYSTEMS

Provide cable and conduit as required by D40, “Fire Protection” and D50, “Electrical.”

G403004 CABLE TV SYSTEMS (CATV)

Provide conduit with pull string between the connection point and equipment room.

G403005 CABLES AND WIRING

Underground copper cable pair in accordance with RUS 345-67. Aerial cable in accordance with RUS 345-67 except that it shall be suitable for aerial installation and shall be Figure 8 distribution wire with 26,700 N (6,000 pound) Class A galvanized steel or 26,700 N (6,000 pound) aluminum-clad steel strand. Screen-compartmental core cable shall be filled cable meeting the requirements of RUS 345-67. FO media shall meet all performance requirements of EIA EIA/TIA-568-A and the physical requirements of ICEA S-87-640 and EIA EIA/TIA-598-A.

G403005 1.1 - PERFORMANCE VERIFICATION TESTS

Test all cables in accordance with industry standards.

G403006 DUCTBANKS, MANHOLES AND HANDHOLES

Provide in accordance with paragraph G401007.

G403009 GROUNDING SYSTEMS

Site communications grounding shall be in accordance with NFPA 70.

G403009 1.1 - PERFORMANCE VERIFICATION TESTS

Test grounding systems in accordance with paragraph G401008.

G403098 OTHER COMMUNICATION AND ALARM

Provide connections to the base Mass Notification System (MNS) in accordance with UFC 4-021-01.

--End of Section--

PART 5

PRESCRIPTIVE TECHNICAL SPECIFICATIONS

SECTION 02360 SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

SECTION 02360

SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL
04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

7 USC Section 136	Federal Insecticide, Fungicide, and Rodenticide Act

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01332N CONSTRUCTION SUBMITTAL PROCEDURES:

SD-03 Product Data

Termiticide Application Plan; G

Termiticide application plan with proposed sequence of treatment work with dates and times. The termiticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area/volume treated, amount applied; and the name and state license number of the state certified applicator shall be included.

Termiticides

Manufacturer's label and Material Safety Data Sheet (MSDS) for termiticides proposed for use.

Foundation Exterior

Written verification that other site work will not disturb the treatment.

Utilities and Vents

Written verification that utilities and vents have been located.

Crawl and Plenum Air Spaces

Written verification that crawl spaces and plenum air spaces have been located.

Verification of Measurement

Written verification that the volume of termiticide used meets the application rate.

Application Equipment

A listing of equipment to be used.

Warranty

Copy of Contractor's warranty.

SD-04 Samples

Termiticides

Submit on request samples of the pesticides used in this work or the Contracting Officer may draw, at any time and without prior notice, from stocks at the job site. Should analysis, performed by the Government, indicate such samples to contain less than the amount of active ingredient specified on the label, work performed with such products shall be repeated, with pesticides conforming to this specification, at no additional cost to the Government.

SD-06 Test Reports

Equipment Calibration and Tank Measurement

Certification of calibration tests conducted on the equipment used in the termiticide application.

Soil Moisture

Soil moisture test result

Quality Assurance

Pest Management Report and copies of daily records signed by an officer of the Contractor.

SD-07 Certificates

Qualifications

Qualifications and state license number of the termiticide applicator.

1.3 QUALIFICATIONS

For the application of pesticides, the Contractor shall use the services of a subcontractor whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed. Termiticide applicators shall also be certified in the U.S. Environmental Protection Agency (EPA) pesticide applicator category which includes structural pest control.

The subcontractor shall:

a. Have personnel with a current State of Mississippi license/ certification, as required by the State of Mississippi Pesticide Laws, for transportation, handling and application of termiticide.

b. Provide a submittal with the following information to the Contracting Officer:

(1) Quantity of pesticide used.

(2) Rate of dispersion.

(3) Percent of use.

(4) Total amount used.

(5) Map of application area indicating treated areas.

(6) A certificate from the Subcontractor that the treatment shall be in accordance with the rules and laws of the State of Mississippi.

1.4 SAFETY REQUIREMENTS

Formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Draw water for formulating only from sites designated by the Contracting Officer, and fit the filling hose with a backflow preventer meeting local plumbing codes or standards. The filling operation shall be under the direct and continuous observation of a contractor's representative to prevent overflow. Secure pesticides and related materials under lock and key when unattended. Ensure that proper protective clothing and equipment are worn and used during all phases of termiticide application. Dispose of used pesticide containers off Government property.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Termiticide material shall be delivered to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials to be used on site for the purpose of termite control shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

1.5.2 Storage

Materials shall be stored in designated areas and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

1.5.3 Handling

Termiticides shall be handled in accordance with manufacturer's labels. Manufacturer's warnings and precautions shall be observed. Materials shall

be handled preventing contamination by dirt, water, and organic material. Protect termiticides from sunlight as recommended by the manufacturer.

1.6 INSPECTION

Termiticides shall be inspected upon arrival at the job site for conformity to type and quality in accordance with paragraph TERMITICIDES. Each label shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended or under appropriate regulations of the host county. Other materials shall be inspected for conformance with specified requirements. Unacceptable materials shall be removed from the job site.

1.7 WARRANTY

The Contractor shall provide a 5-year written warranty against infestations or reinfestations by subterranean termites of the buildings or building additions constructed under this contract. Warranty shall include annual inspections of the buildings or building additions. If live subterranean termite infestation or subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall:

a. Retreat the soil and perform other treatment as may be necessary for elimination of subterranean termite infestation;

b. Repair damage caused by termite infestation; and

c. Reinspect the building approximately 180 days after the retreatment.

1.8 QUALITY ASSURANCE

The Contractor shall comply with 7 USC Section 136 for requirements on contractor's licensing, certification, and record keeping. The Contractor shall maintain daily records using Pest Management Maintenance Record, DD Form 1532-1 and submit copies of records when requested by the Contracting Officer. These forms may be obtained from the main web site:

http://www.dtic.mil/whs/directives/infomgt/forms/ddforms1500-1999.htm

Upon completion of this work, submit Pest Management Report. DD Form 1532 identifying target pest, type of operation, brand name and manufacturer of pesticide, formulation, concentration or rate of application used.

PART 2 PRODUCTS

2.1 TERMITICIDES

Termiticides shall be currently registered by the EPA or approved for such use by the appropriate agency of the State of Mississippi. Non-repellant termiticide shall be selected for maximum effectiveness and duration after application. The selected termiticide shall be suitable for the soil and climatic conditions at the project site.

PART 3 EXECUTION

3.1 TECHNICAL REPRESENTATIVE

The certified installation pest management coordinator shall be the technical representative, shall be present at all meetings concerning treatment measures for subterranean termites, and may be present during treatment application. The command Pest Control Coordinator shall be contacted prior to starting work.

3.2 SITE PREPARATION

Work related to final grades, landscape plantings, foundations, or any other alterations to finished construction which might alter the condition of treated soils, shall be coordinated with this specification.

3.2.1 Ground Preparation

Food sources shall be eliminated by removing debris from clearing and grubbing and post construction wood scraps such as ground stakes, form boards, and scrap lumber from the site, before termiticide application begins.

3.2.2 Verification

Before work starts, the Contractor shall verify that final grades are as indicated and smooth grading has been completed. Soil particles shall be finely graded with particles no larger than 1 inch and compacted to eliminate soil movement to the greatest degree.

3.2.3 Foundation Exterior

The Contractor shall provide written verification that final grading and landscape planting operations will not disturb treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures.

3.2.4 Utilities and Vents

The Contractor shall provide written verification that the location and identity of HVAC ducts and vents, water and sewer lines, and plumbing have been accomplished prior to the termiticide application.

3.2.5 Crawl and Plenum Air Spaces

The Contractor shall provide written verification that the location and identity of crawl and plenum air spaces have been accomplished prior to the termiticide application.

3.3 SITE CONDITIONS

The following conditions shall determine the time of application.

3.3.1 Soil Moisture

Soils to be treated shall be tested immediately before application. Soil moisture content shall be tested to a minimum depth of 3 inches. The soil moisture shall be as recommended by the termiticide manufacturer. The termiticide will not be applied when soil moisture exceeds manufacturer's

recommendations because termiticides do not adhere to the soil particles in saturated soils.

3.3.2 Runoff and Wind Drift

Termiticide shall not be applied during or immediately following heavy rains. Applications shall not be performed when conditions may cause runoff or create an environmental hazard. Applications shall not be performed when average wind speed exceeds 10 miles per hour. The termiticide shall not be allowed to enter water systems, aquifers, or endanger humans or animals.

3.3.2.1 Vapor Barriers and Waterproof Membranes

Termiticide shall be applied prior to placement of a vapor barrier or waterproof membrane.

3.3.2.2 Utilities and Vents

Prior to application, HVAC ducts and vents located in treatment area shall be turned off and blocked to protect people and animals from termiticide.

3.3.3 Placement of Concrete

Concrete covering treated soils shall be placed as soon as the termiticide has reached maximum penetration into the soil. Time for maximum penetration shall be as recommended by the manufacturer.

3.4 TERMITICIDE TREATMENT

The Contractor shall submit a Termiticide Application Plan for approval before starting the specified treatment.

3.4.1 Equipment Calibration and Tank Measurement

Immediately prior to commencement of termiticide application, calibration tests shall be conducted on the application equipment to be used and the application tank shall be measured to determine the volume and contents. These tests shall confirm that the application equipment is operating within the manufacturer's specifications and will meet the specified requirements. The Contractor shall provide written certification of the equipment calibration test results within 1 week of testing.

3.4.2 Mixing and Application

Formulating, mixing, and application shall be performed in the presence of the Contracting Officer or the technical representative. A closed system is recommended as it prevents the termiticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying termiticides shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.4.3 Treatment Method

For areas to be treated, the Contractor shall establish complete and unbroken vertical and/or horizontal soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products. Application shall not be made to areas which serve as crawl spaces or for use as a plenum air space.

3.4.3.1 Surface Application

Surface application shall be used for establishing horizontal barriers. Surface applicants shall be applied as a coarse spray and provide uniform distribution over the soil surface. Termiticide shall penetrate a minimum of 1 inch into the soil, or as recommended by the manufacturer.

3.4.3.2 Rodding and Trenching

Rodding and trenching shall be used for establishing vertical soil barriers. Trenching shall be to the depth of the foundation footing. Width of trench shall be as recommended by the manufacturer, or as indicated. Rodding or other approved method may be implemented for saturating the base of the trench with termiticide. Immediately after termiticide has reached maximum penetration as recommended by the manufacturer, backfilling of the trench shall commence. Backfilling shall be in 6-inch rises or layers. Each rise shall be treated with termiticide.

3.4.4 Sampling

The Contracting Officer may draw from stocks at the job site, at any time and without prior notice, samples of the termiticides used to determine if the amount of active ingredient specified on the label is being applied.

3.5 VERIFICATION OF MEASUREMENT

Once termiticide application has been completed, tank contents shall be measured to determine the remaining volume. The total volume measurement of used contents for the application shall equal the established application rate for the project site conditions. The Contractor shall provide written verification of the measurements.

3.6 CLEAN UP, DISPOSAL, AND PROTECTION

Once application has been completed, the Contractor shall proceed with clean up and protection of the site without delay.

3.6.1 Clean Up

The site shall be cleaned of all material associated with the treatment measures, according to label instructions, and as indicated. Excess and waste material shall be removed and disposed off site.

3.6.2 Disposal of Termiticide

The Contractor shall dispose of residual termiticides and containers off Government property, and in accordance with label instructions and EPA criteria.

3.6.3 Protection of Treated Area

Immediately after the application, the area shall be protected from other use by erecting barricades and providing signage as required or directed. Signage shall be placed inside the entrances to crawl spaces and shall identify the space as treated with termiticide and not safe for children and animals.

3.7 CONDITIONS FOR SATISFACTORY TREATMENT

3.7.1 Equipment Calibrations and Measurements

Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

3.7.2 Testing

Should an analysis, performed by a third party, indicate that the samples of the applied termiticide contain less than the amount of active ingredient specified on the label, and/or if soils are treated to a depth less than specified or approved, re-treatment will be required.

3.7.3 Disturbance of Treated Soils

Soil and fill material disturbed after treatment shall be re-treated before placement of slabs or other covering structures.

3.7.4 Termites Found Within the Warranty Period

If live subterranean termite infestation or termite damage is discovered during the warranty period, the Contractor shall re-treat the site.

3.8 RE-TREATMENT

Where re-treatment is required, the Contractor shall comply with the requirements specified in paragraph WARRANTY.

--End of Section--

PART 6

ATTACHMENTS

1 PERFORMANCE DRAWINGS
2 TOPOGRAPHIC SURVEYS
3 WATER FLOW TEST
4 GEOTECHNICAL REPORTS
5 LIST OF RECORD DRAWINGS
6 CONTRACTOR DATA REQUIRED FOR DD FORM 1354
7 SSC FACILITY ELECTRICAL STANDARD
8 SSC FACILITY MSS DESIGN ENGINEERING CHECKLIST
9 ROOM FINISH SCHEDULE
10 WASH RACK FACILITY
11 RECORD OF ENVIRONMENTAL CONSIDERATION FROM NASA
12 NASA SITE APPROVAL

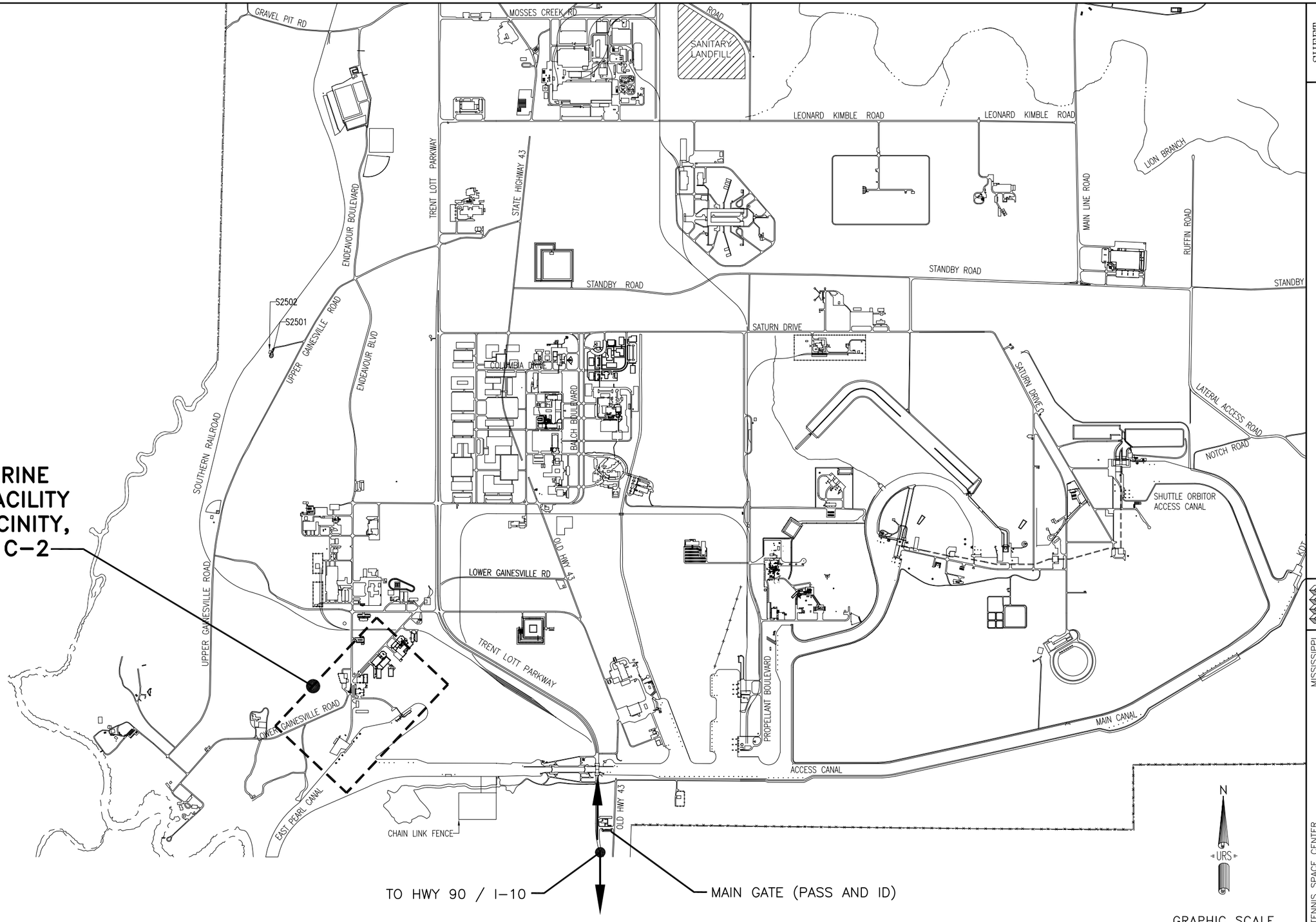
ATTACHMENT 1

PERFORMANCE DRAWINGS

SHEET	TITLE
C-1	Location Plan
C-2	Vicinity and Sheet Layout Plan
C-3	New Operations Building, Maintenance, and Storage Complex Area
C-4	New Operations Building, Maintenance, and Storage Complex Area
C-5	New Wash Rack and Sheet Pile Wall Area
C-6	New Helipad Area
C-7	Utilities Points of Connection Plan
A-1	Operations Building First Floor Relationship Diagram
A-2	Operations Building Second Floor Relationship Diagram
A-3	Boat Maintenance Building Conceptual Floor Plan
A-4	Boat Storage Building Conceptual Floor Plan

LOCATION PLAN

P-201 RIVERINE TRAINING FACILITY PROJECT VICINITY, SEE SHEET C-2



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MISSISSIPPI
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NEW OPERATIONS BUILDING, MAINTENANCE, AND STORAGE COMPLEX AREA

THIS AREA CONTAINS NUMEROUS TRAINING FACILITIES BUILT SINCE THIS BACKGROUND SURVEY WAS PERFORMED

NEW WASH RACK AREA

LOWER GAINESVILLE ROAD

ENDEAVOUR BLVD.

SHEET C-3

SHEET C-4

SHEET C-5

SHEET C-6

BOAT RAMP WIDENING

APPROXIMATE EXISTING SHORELINE

EXISTING
EAST PEARL CANAL

NEW SHEET PILE WALL AREA

NEW HELIPAD AREA

N

URS

GRAPHIC SCALE

0 100' 200'

SHEET C-2

VICINITY AND SHEET LAYOUT PLAN

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NOTE:
NEW FACILITIES ARE SHOWN IN BOLD LINEWORK
AND BOLD TEXT UNLESS INDICATED OTHERWISE

LOWER GAINESVILLE ROAD
EXISTING ASPHALT ROAD

SECURITY
FENCE

EXISTING AGGREGATE ROAD

PARKING FOR
90± POV

ASPHALT PAVEMENT

ALLOWABLE
CONSTRUCTION
WORK AREA FOR
MAIN COMPLEX

4 TRUCKS
&
TRAILERS

PEDESTRIAN TURNSTILE

CONCRETE SIDEWALK
(8' MIN WIDTH)

CONCRETE PAVEMENT

30 GOVT VEH

BOAT MAINT
BLDG 2441

BLDG 2442
STORAGE
(12 BOATS)

FOR CONTINUATION SEE SHEET C-4

GRAPHIC SCALE
0 30' 60'

SHEET
C-3

NEW OPERATIONS BUILDING, MAINTENANCE, AND
STORAGE COMPLEX AREA

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FOR CONTINUATION SEE SHEET C-3

30 GOVT VEH

CONCRETE PAVEMENT

ASPHALT PAVEMENT

BOAT MAINT BLDG 2441

BLDG 2442 STORAGE (12 BOATS)

OPERATIONS BLDG 2440

ALLOWABLE CONSTRUCTION WORK AREA FOR MAIN COMPLEX

ACCESS DRIVE

SECURITY FENCE

VEHICLE GATE

APPROXIMATE EXISTING SHORELINE

EXISTING EAST PEARL CANAL

EXACT END OF EXISTING RAMP LOCATION UNKNOWN, ELEVATION APPROX. -5

EXISTING BOAT RAMP

WIDEN EXISTING CONCRETE BOAT RAMP BY 14 FEET

EXISTING WHARF

SHED # 2401 EXISTING MAINTENANCE BUILDING

EXISTING ENDEAVOUR BLVD.

TEMP. BLDG.

BLDG. # 2403

N 311138.3113
E 723722.7685
Z = 20.42'

N 310988.7541
E 732989.8797
Z = 12.42'

N 310988.9875
E 732811.2050
Z = 18.37'

AVERAGE WATER ELEVATION = 2.0'+/-

NOTES:
1. NEW FACILITIES ARE SHOWN IN BOLD LINEWORK AND BOLD TEXT UNLESS INDICATED OTHERWISE.
2. DURING CONSTRUCTION THE CONTRACTOR SHALL MAINTAIN ACCESS FOR NASA ACTIVITIES RELATING TO EXISTING WHARF, BOAT RAMP, AND MAINTENANCE BUILDING.

GRAPHIC SCALE
0 30' 60'

NEW OPERATIONS BUILDING, MAINTENANCE, AND STORAGE COMPLEX AREA

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PUMP ROOM

WASH RACK

ALLOWABLE CONSTRUCTION WORK AREA FOR WASH RACK FACILITY

ALLOWABLE CONSTRUCTION WORK AREA FOR SHEET PILE QUAY WALL

GRAPHIC SCALE
0 30' 60'

LIFTSTATION TOP ELEV.=20.19 INVT. ELEV.=12.07

3" PVC INVT. ELEV.=17.79

LIFTSTATION TOP ELEV.=20.22 INVT. ELEV.=16.12

1 STORY METAL BUILDING F.F.E.=25.22

BLDG. #2402

CONCRETE SURFACE

DITCH CENTERLINE

EDGE OF WOODS

TRAVERSE LINE

CONCRETE

WOOD WALK

FLOATING PIER

FIRE HYDRANT

CONCRETE ACCESS PAVEMENT

SHEET PILE QUAY WALL WITH CONCRETE CAP AND RUB STRIP, BACKFILL ON LAND SIDE OF WALL TO PRODUCE LEVEL GRADE

APPROXIMATE EXISTING SHORELINE

EXISTING EAST PEARL CANAL

NOTES:
1. A FULL DESIGN HAS BEEN PREPARED FOR THE WASH RACK AND ASSOCIATED FACILITIES. THESE DOCUMENTS ARE INCLUDED IN PART 6 OF THIS RFP.
2. NEW FACILITIES ARE SHOWN IN BOLD LINEWORK AND BOLD TEXT UNLESS INDICATED OTHERWISE.

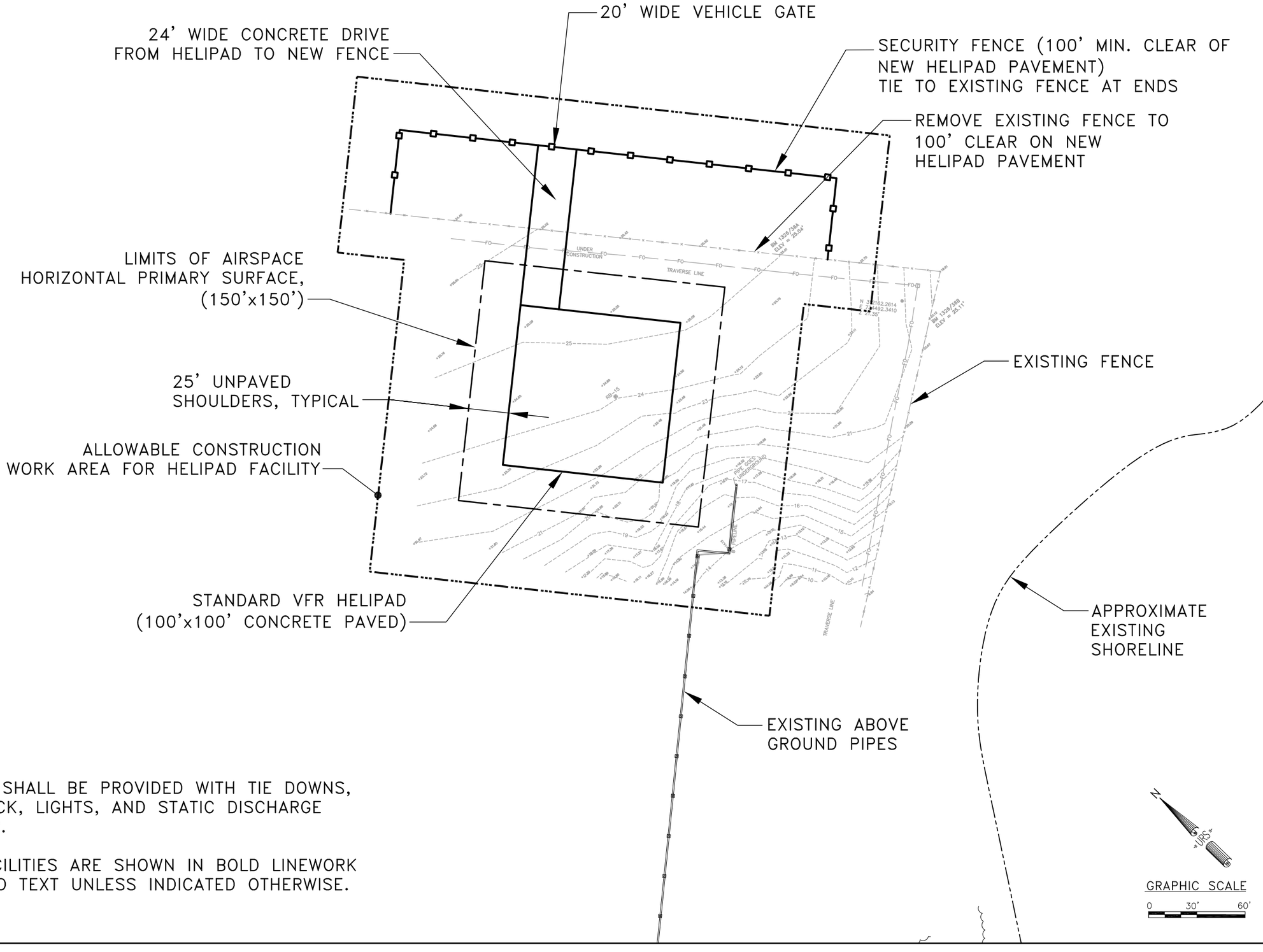
SHEET C-5

NEW WASH RACK AND SHEET PILE WALL AREA

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NEW HELIPAD AREA



NOTES:

1. HELIPAD SHALL BE PROVIDED WITH TIE DOWNS, WIND SOCK, LIGHTS, AND STATIC DISCHARGE HOOK-UP.

2. NEW FACILITIES ARE SHOWN IN BOLD LINEWORK AND BOLD TEXT UNLESS INDICATED OTHERWISE.

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LEGEND:
POC = POINT OF CONNECTION

NOTE: NEW UTILITY DISTRIBUTIONS TO THE FACILITIES IN THIS PROJECT WILL REQUIRE WORK BEYOND THE ALLOWABLE CONSTRUCTION WORK AREAS SHOWN ON THESE PERFORMANCE DRAWINGS.

ENDEAVOUR BOULEVARD

APPROXIMATE LOCATION OF EXISTING COMM MH

EXISTING 1" NATURAL GAS

LOWER GAINESVILLE ROAD

LOWER GAINESVILLE ROAD

EXISTING 4" SAN FM

EXISTING 2" SAN FM

EXISTING 8" WATER

POTENTIAL POC FOR FIRE AND POTABLE WATER (8" MAIN, TIE-IN MUST BE UPSTREAM OF 6" MAIN)

EXISTING 6" WATER

2600

2601

2602

2603

2606

NEW WASH RACK AREA

POTENTIAL POC FOR NATURAL GAS

POTENTIAL POC FOR DATA, VOICE, CATV, AND PA SYSTEMS

BOAT RAMP WIDENING AREA

POTENTIAL POC FOR SECURITY AND CCTV SYSTEMS

POTENTIAL POC FOR ELECTRICAL (CONSTRUCT NEW RISER POLE IN LINE WITH EXISTING PRIMARY LINE)

POTENTIAL POC FOR ELECTRICAL TO THE HELIPAD AREA

POTENTIAL POC FOR SANITARY, LIFT STATION NO. 33

EXISTING ELECTRICAL PRIMARY DISTRIBUTION SYSTEM

NEW HELIPAD AREA

EXISTING UTILITY POWER POLE (TYP)

NEW OPERATIONS BUILDING, MAINTENANCE, AND STORAGE COMPLEX AREA

EAST PEARL CANAL

NEW SHEET PILE WALL AREA

GRAPHIC SCALE
0 100' 200'

SHEET C-7

UTILITIES POINTS OF CONNECTION PLAN

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RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\C-7 UTIL POC.dwg 06/03/2008 9:56

POV PARKING

ENTRY

STAIR TO 2nd FLR.

MECH. ELEC. COMM. JANITOR

CAGES

MALE SHOWER

MALE HEAD

CORRIDOR

FEMALE HEAD

FEMALE SHOWER

CSS

WIRE MESH PARTITIONS (TYP.)

AREA A

AREA B

ARMORY

AREA C

VESTIBULE

*

*

BOAT STORAGE BUILDING
12 BOATS

EQUIPMENT YARD

BOAT MAINTENANCE BUILDING

LEGEND

* = VAULT DOOR

↔ = PRIMARY RELATIONSHIP/ CONNECTIVITY

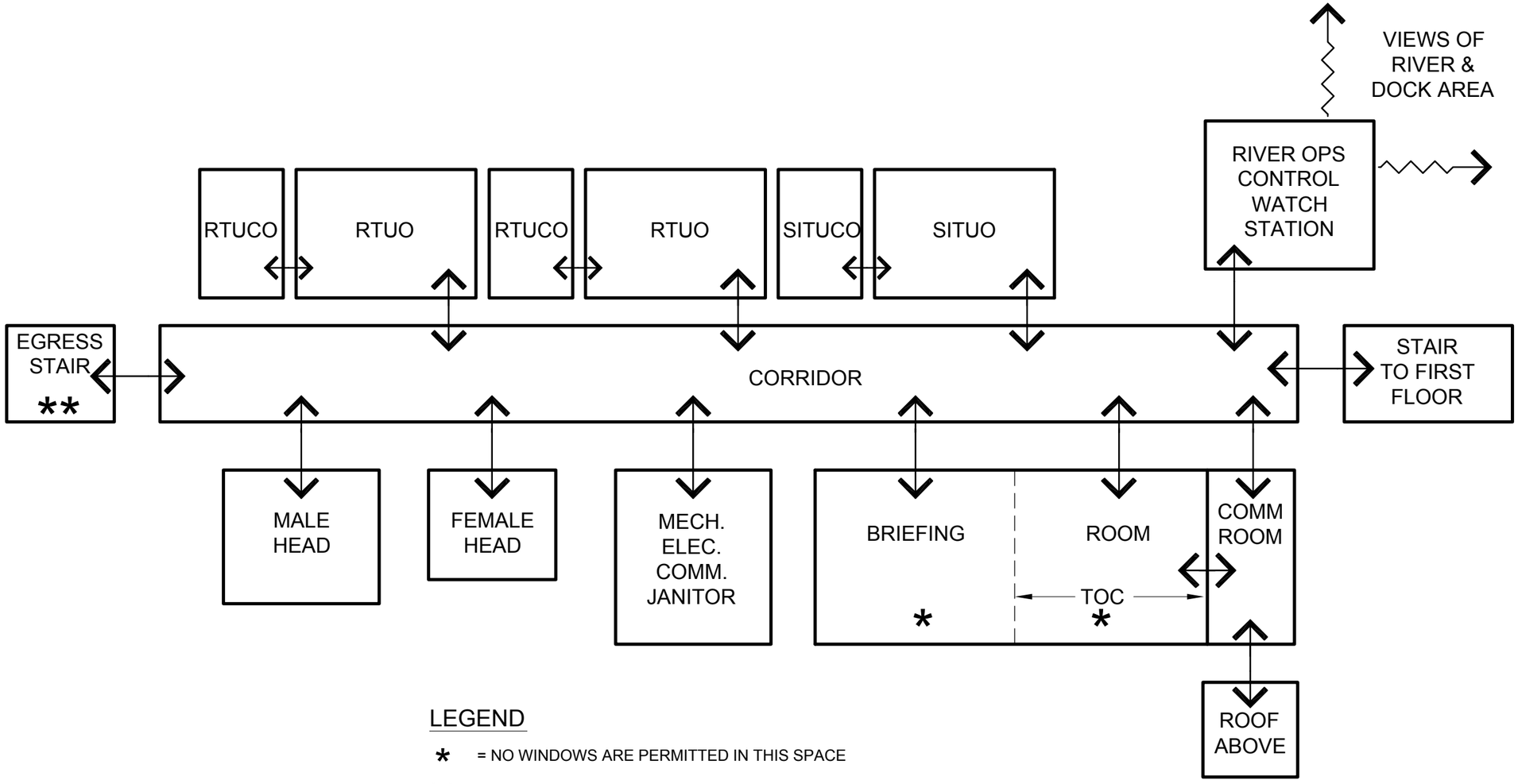
1 / A-1 OPERATIONS BUILDING
FIRST FLOOR RELATIONSHIP DIAGRAM
SCALE: NOT TO SCALE

SHEET A-1

OPERATIONS BUILDING
FIRST FLOOR RELATIONSHIP DIAGRAM

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OPERATIONS FACILITY

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LEGEND

* = NO WINDOWS ARE PERMITTED IN THIS SPACE

** = THIS STAIR CAN BE AN EXTERIOR STAIR

↔ = PRIMARY RELATIONSHIP/CONNECTIVITY

RTUO = RIVERINE TASK UNIT OFFICE

RTUCO = RIVERINE TASK UNIT COMMANDER OFFICE

SITUO = SQUADRON INTEROPERABILITY TASK UNIT OFFICE

SITUCO = SQUADRON INTEROPERABILITY TASK UNIT COMMANDER OFFICE

1 / A-2 OPERATIONS BUILDING
SECOND FLOOR RELATIONSHIP DIAGRAM

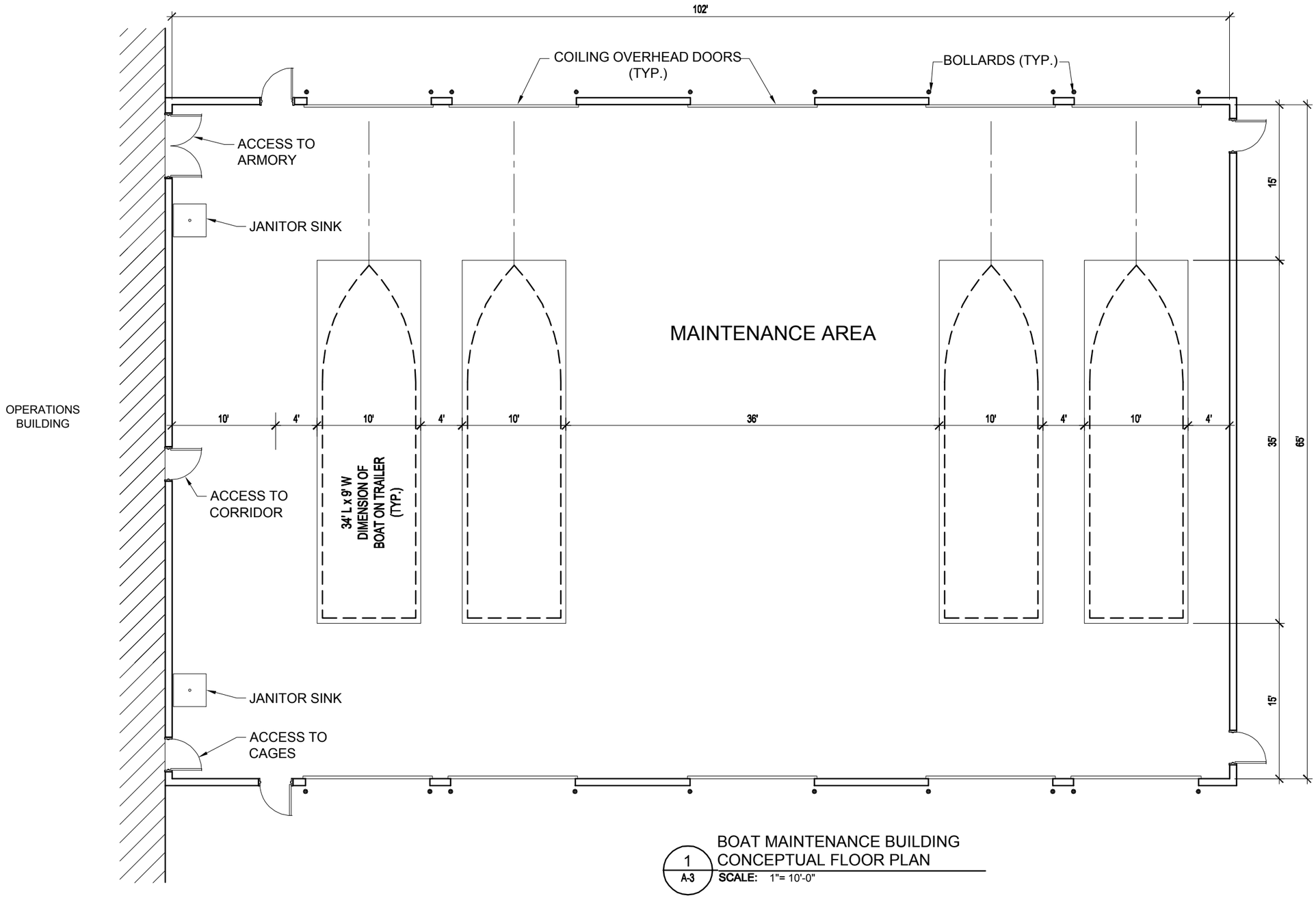
SCALE: NOT TO SCALE

SHEET A-2

OPERATIONS BUILDING
SECOND FLOOR RELATIONSHIP DIAGRAM

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1 A-3 BOAT MAINTENANCE BUILDING CONCEPTUAL FLOOR PLAN

SCALE: 1"= 10'-0"

GRAPHIC SCALE

SCALE: 1"= 10'-0"

0 5' 10'

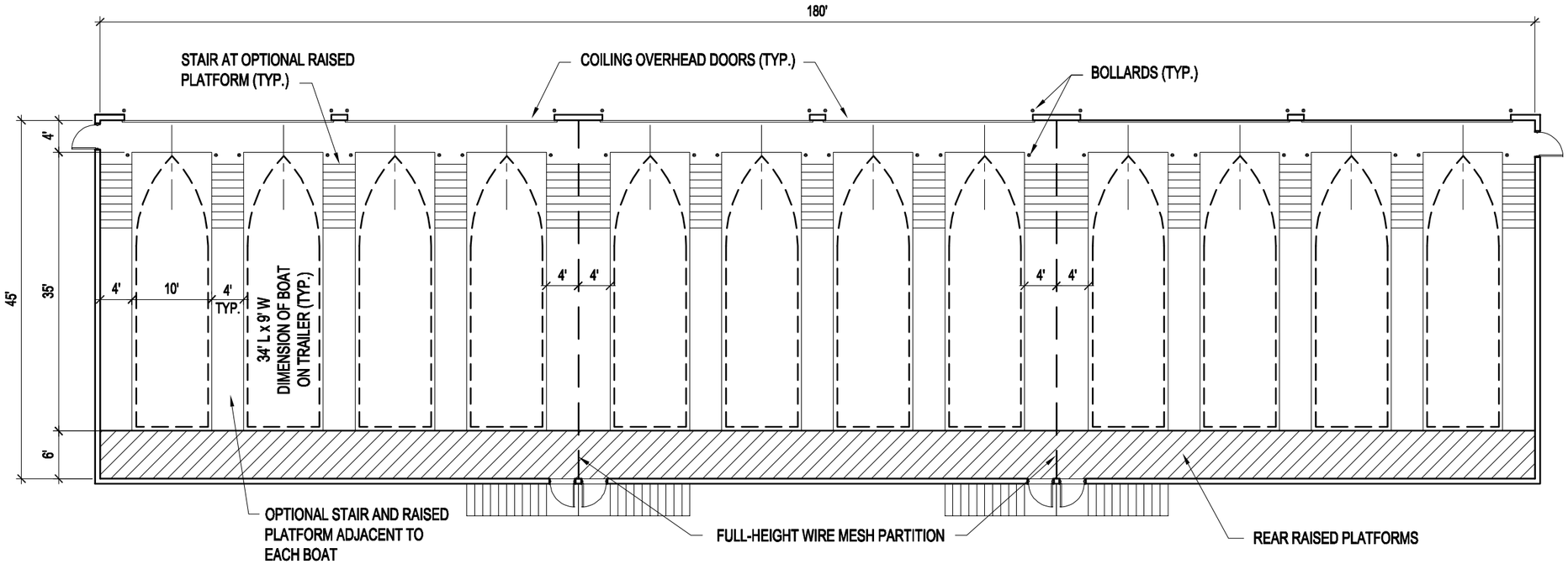
SHEET A-3

BOAT MAINTENANCE BUILDING
CONCEPTUAL FLOOR PLAN

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1 / A-4 BOAT STORAGE BUILDING CONCEPTUAL FLOOR PLAN

SCALE: 1/16"= 1'-0"

GRAPHIC SCALE

SCALE: 1/16"= 1'-0"

0 8' 16'

SHEET A-4

BOAT STORAGE BUILDING
CONCEPTUAL FLOOR PLAN

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OPERATIONS FACILITY

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ATTACHMENT 2

TOPOGRAPHIC SURVEYS

Project Topographic Surveys Key Plan

OPS Building, Maintenance, and Storage Complex
Western Portion, Sheets 1 and 2 of 2

OPS Building, Maintenance, and Storage Complex
Eastern Portion, Sheets 1, 2 and 3 of 3

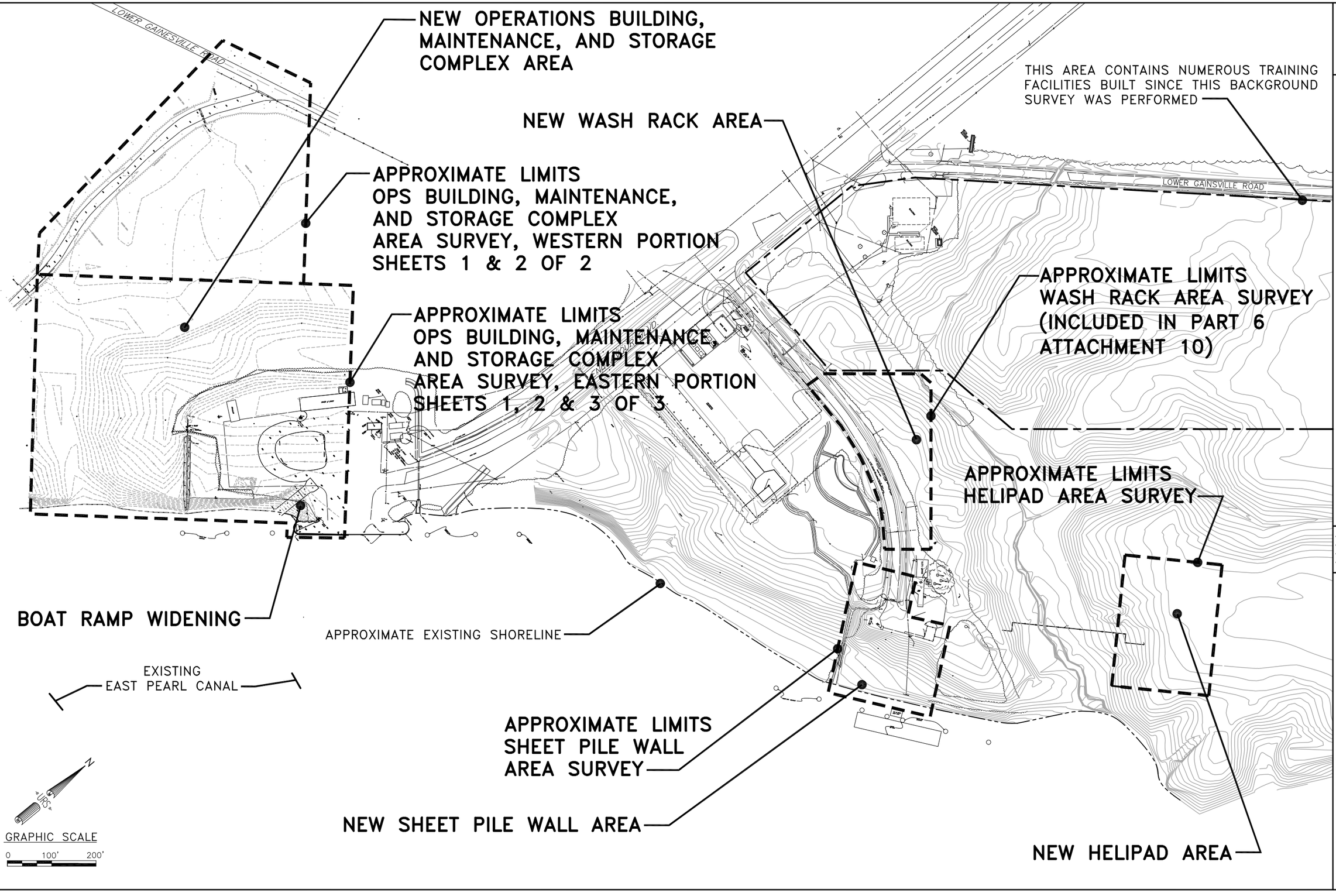
Sheet Pile Wall Area

Helipad Area

ATTACHMENT 2

TOPOGRAPHIC SURVEYS

Project Topographic Surveys Key Plan



SHEET 1 OF 1

PROJECT TOPOGRAPHIC SURVEYS KEY PLAN

JOHN C. STENNIS SPACE CENTER MISSISSIPPI

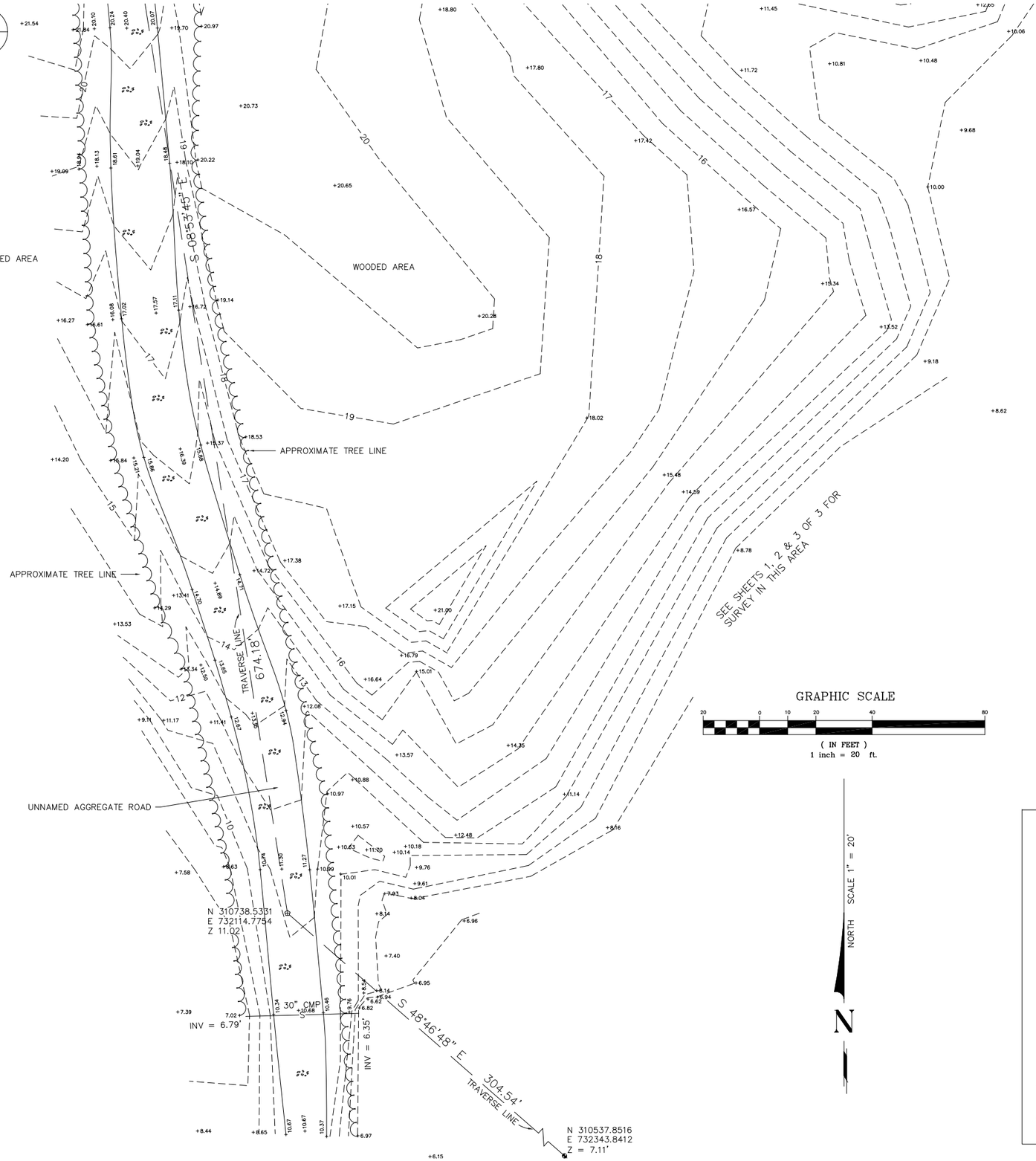
RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

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ATTACHMENT 2

TOPOGRAPHIC SURVEYS

OPS Building, Maintenance, and Storage Complex
Western Portion, Sheets 1 and 2 of 2



SURVEYOR'S NOTES:
1. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. THE SURVEYOR DOES NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES OR THAT THEY ARE THE EXACT SIZE, MATERIAL, OR LOCATION AS INDICATED.
2. THIS SURVEY DOES NOT REFLECT OR DETERMINE OWNERSHIP.
3. THIS SURVEY IS SUBJECT TO ANY FACTS THAT MAY BE DISCLOSED BY A FULL AND ACCURATE TITLE SEARCH.
4. THIS SURVEY IS SUBJECT TO SETBACKS, EASEMENTS, AND RESTRICTIONS OF RECORD.
5. TO ASSURE THE CONTRACTOR IS ON THE SAME VERTICAL AND HORIZONTAL DATUM AS THIS SURVEY, IT IS STRONGLY RECOMMENDED THAT VERTICAL CHECKS BE MADE BETWEEN TWO BENCHMARKS AND THAT HORIZONTAL CHECKS BE MADE BETWEEN THREE CONTROL POINTS OR PROPERTY CORNERS.
6. FOOTINGS AND FOUNDATIONS BELOW NATURAL GROUND NOT LOCATED.
7. COORDINATES SHOWN ARE STATE PLANE COORDINATES REFERENCED TO NAD 83, MISSISSIPPI EAST ZONE AND ARE EXPRESSED IN U.S. SURVEY FEET.
8. CONTROL MONUMENTS USED:

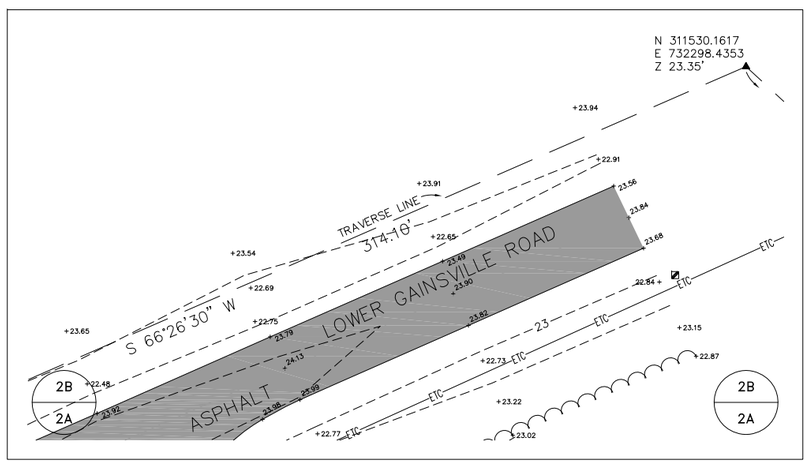
DESIGNATION	PID	NORTHING	EASTING
WAREHOUSE	AI7170	314161.2647	733265.8563
DEAD END	AI7169	316506.4470	736781.1085

UTILITY COMPANIES:
UTILITY INFORMATION SHOWN AS PER FIELD INFORMATION AND INFORMATION FURNISHED BY UTILITY COMPANIES INVOLVED.
BURIED UTILITIES SHOWN ARE BASED ON INFORMATION FURNISHED BY THE DEPARTMENT OF THE NAVY.

BENCH MARKS:
1323/62 – AN 'X' IN THE NORTH BONNET BOLT OF A FIRE HYDRANT LOCATED N 90° W ON THE MOST SOUTHERLY END OF ENDEAVOR BOULEVARD FOR A DISTANCE OF 186'+/– AND 20'+/– SOUTHEAST OF THE SOUTHEAST SIDE OF A 30' x 124' COVERED AREA (BUILDING #2407).
ELEVATION = 21.63'
1323/62A – A RAILROAD SPIKE IN THE NORTH SIDE OF A LIGHT POLE LOCATED S 57° W FOR A DISTANCE OF 443'+/– FROM THE MOST SOUTHERLY END OF ENDEAVOR BOULEVARD.
ELEVATION= 21.58'
1323/62B – A 6" X 6" CONCRETE MONUMENT WITH BRASS DISK STAMPED "CORP OF ENGINEERS U.S. ARMY RP1 YEAR 1963 430'+/– WEST OF THE CENTERLINE OF HARBOR.
ELEVATION = 10.90'
TBM HEADWALL – A SQUARE CUT IN CORNER OF CONCRETE HEADWALL LOCATED AT ELBOW OF DITCH NEAR NORTHEAST CORNER OF BUILDING #2403.
ELEVATION = 12.29'
1309/47 – A COTTON GIN SPIKE IN THE SOUTH SIDE OF A POWER POLE LOCATED IN THE NORTH RIGHT OF WAY OF LOWER GAINESVILLE ROAD AND 475'+/– WEST INTERSECTION OF LOWER GAINESVILLE ROAD AND ENDEAVOUR BOULEVARD.
ELEVATION = 24.10'
1309/47A – A COTTON GIN SPIKE IN THE NORTHEAST SIDE OF A POWER POLE LOCATED 900'+/– WEST OF THE INTERSECTION OF LOWER GAINESVILLE ROAD AND ENDEAVOUR ROAD; ALSO BEING IN THE SOUTHWEST CORNER OF THE INTERSECTION OF LOWER GAINESVILLE ROAD AND THE GRAVEL ACCESS ROAD TO BUILDINGS #B–2437 THRU B–2439.
ELEVATION = 23.71'

LEGEND:

FFE	FINISHED FLOOR ELEVATION
INV	INVERT
FL	FLOW LINE
BM	BENCH MARK
ELEV	ELEVATION
CMP	CORRUGATED METAL PIPE
●	1/2" CAPPED IRON ROD SET #7073
■	CONCRETE MONUMENT FOUND
▲	HUB AND TACK SET
	FIRE HYDRANT
	WATER VALVE
	WATER METER
	GAS METER
	ELECTRIC BOX
	SEWER CLEANOUT
	LIGHT POLE
	POWER POLE
	GUARD POST
	BOAT TIE
18	CONTOUR LINE
E	ELECTRIC LINE
S	STORM SEWER LINE
+12.78	SPOT ELEVATION
	NAIL AND FLAGGING SET



Measurements made in accordance with United States Standards.

Bearing Reference NORTH BASED ON STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Ordered By MR. FRED WALKER Elevation Reference FURNISHED
Date of Survey 2-1-08 Date of Plot 2-10-08
Encroachments

A LOCATION OF IMPROVEMENTS AND TOPOGRAPHIC SURVEY OF A PORTION OF NCBC GULF PORT, STENNIS SPACE CENTER P–210, RIVERINE TRAINING FACILITY PREFERRED SITE

PITTMAN, GLAZE AND ASSOCIATES, INC.
LAND SURVEYORS
700 NORTH NINTH AVENUE
PENSACOLA, FLORIDA 32501
(850) 434-6666 FAX (850) 434-6661
EMAIL pgasurvey@bellsouth.net

Source of information STATE PLANE COORDINATE FROM CLIENT; PUBLIC RECORDS; SURVEYS BY THIS FIRM

I hereby certify that this survey was made under my responsible charge and meets the Minimum Technical Standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17–6, Florida Administration Code, pursuant to Section 472–027, Florida Statutes.

David D. Glaze ☐ PSM #5605
Walter J. Glaze ■ PSM #6190

SHEET 1 OF 2
LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5906
JOB NO. 33542-08
FB 1309 PG 45-55
FB ____ PG ____
Drawn by PMJ

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\OPERATIONS WEST SURVEY.dwg 06/03/2008 10:17

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\OPERATIONS WEST SURVEY.dwg 06/03/2008 10:17

N 311404.6182
E 732010.5081
TRAVERSE LINE
S 66°26'30" W 314.10'

ASPHALT

LOWER GAINSVILLE ROAD

BM 1309/47A
ELEV = 23.71'

UNNAMED AGGREGATE ROAD

WOODED AREA

WOODED AREA

INV = 20.45' 12" CMP

INV = 19.57'

APPROXIMATE TREE LINE

TRAVERSE LINE
S 08°53'45" E 674.18'

APPROXIMATE TREE LINE

TRAVERSE LINE
N 47°16'44" W 577.59'

N 311138.2958
E 723722.7814

SEE SHEETS 1, 2 & 3 OF 3 FOR SURVEY IN THIS AREA

2B / 2A

2A / 1

TYPICAL TREE COUNT FOR A 100'x100' AREA:

8"–11" HARD WOODS:	2
8"–11" SOFT WOODS:	3
8"–11" MAGNOLIA:	2
12"–17" HARDWOODS:	2
12"–17" SOFT WOODS:	2
12"–17" MAGNOLIA:	0
18"+ HARDWOODS:	0
18"+ SOFT WOODS:	2
18"+ MAGNOLIA:	0
TOTAL TREES:	13

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

NORTH SCALE 1" = 20'

N

Measurements made in accordance with United States Standards.

Bearing Reference NORTH BASED ON: STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Ordered By MR. FRED WALKER Elevation Reference FURNISHED
Date of Survey 2-1-08 Date of Plot 2-10-08
Encroachments

A LOCATION OF IMPROVEMENTS AND TOPOGRAPHIC SURVEY OF A PORTION OF NCBC GULF PORT, STENNIS SPACE CENTER P-210, RIVERINE TRAINING FACILITY PREFERRED SITE

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(850) 434-6666 FAX (850) 434-6661
EMAIL pgasurvey@bellsouth.net

I, hereby certify that this survey was made under my responsible charge and meets the Minimum Technical Standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17-6, Florida Administration Code, pursuant to Section 472-027, Florida Statutes.

David D. Glaze ☐ PSM #5605
Walter J. Glaze ■ PSM #6190

Source of information STATE PLANE COORDINATE FROM CLIENT; PUBLIC RECORDS; SURVEYS BY THIS FIRM

SHEET 2 OF 2

LB No. 7073

NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5907
JOB NO. 33542-08
FB 1309 PG 45-55
FB ____ PG ____

Drawn by PMJ

ATTACHMENT 2

TOPOGRAPHIC SURVEYS

OPS Building, Maintenance, and Storage Complex
Eastern Portion, Sheets 1, 2 and 3 of 3

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

NORTH SCALE 1" = 20'

N

TYPICAL TREE COUNT FOR A 100'x100' AREA:

8"–12" HARD WOODS:	15
8"–12" PINE TREES:	5
8"–12" MAGNOLIA:	3
12"–18" HARDWOODS:	14
12"–18" PINE TREES:	2
18"+ HARDWOODS:	6
18"+ PINE TREES:	2
TOTAL TREES:	49

SEE SHEETS 1 & 2 OF 2 FOR SURVEY IN THIS AREA

APPROXIMATE LIMITS OF WOODS

METAL BUILDING ON CONCRETE PAD

EYE & BODY WASH SYSTEM

WOOD FRAME AND METAL COVERED AREA #2407

BM 1323/62
ELEV = 21.63'

N 311138.3113
E 723722.7685
Z = 20.42'

N 311058.9875
E 723812.2050

TRAVERSE LINE
N 41°06'46" W
118.79'

TRAVERSE LINE
S 41°53'09" W
300.08'

TRAVERSE LINE
384.18'

GRAVEL

124.0'
124.0'
30.0'
30.0'

Measurements made in accordance with United States Standards.

Bearing Reference STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Elevation Reference FURNISHED
Ordered By SHERRI ERIKSEN
Date of Survey 9-23-06
Date of Plat 9-27-06
Encroachments

A LOCATION OF IMPROVEMENTS AND TOPOGRAPHIC SURVEY OF A PORTION OF NCBC GULF PORT, STENNIS SPACE CENTER P201; RIVERINE TRAINING CENTER

PITTMAN PGA LAZE ASSOCIATES, INC.
LAND SURVEYORS
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PENSACOLA, FLORIDA 32501
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David D. Glaze
PSM #5605

Walter J. Glaze
PSM #6190

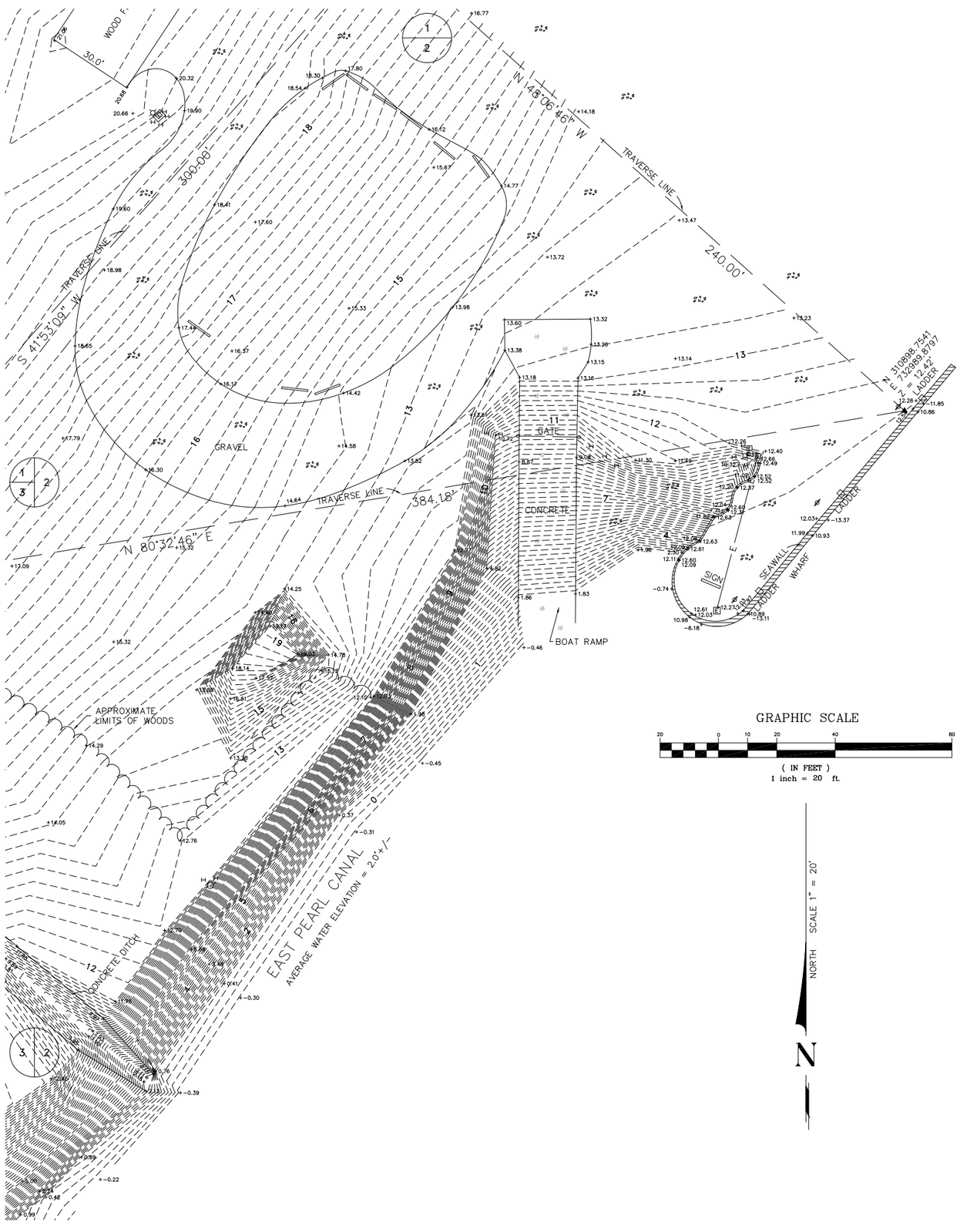
SHEET 1 OF 3

LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5578
JOB NO. 32786-06
FB 1323 PG 60-70
FB ____ PG ____

Drawn by PMJ

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\OPERATIONS EAST SURVEY.dwg 06/03/2008 10:15



GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

NORTH SCALE 1" = 20'

N

SURVEYOR'S NOTES:
1. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. THE SURVEYOR DOES NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES OR THAT THEY ARE THE EXACT SIZE, MATERIAL, OR LOCATION AS INDICATED.
2. THIS SURVEY DOES NOT REFLECT OR DETERMINE OWNERSHIP.
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6. FOOTINGS AND FOUNDATIONS BELOW NATURAL GROUND NOT LOCATED.
7. COORDINATES SHOWN ARE STATE PLANE COORDINATES REFERENCED TO NAD 83, MISSISSIPPI EAST ZONE AND ARE EXPRESSED IN U.S. SURVEY FEET.
8. CONTROL MONUMENTS USED:

DESIGNATION	PID	NORTHING	EASTING
WAREHOUSE	AI7170	314161.2647	733265.8563
DEAD END	AI7169	316506.4470	736781.1085

UTILITY COMPANIES:
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BURIED UTILITIES SHOWN ARE BASED ON INFORMATION FURNISHED BY THE DEPARTMENT OF THE NAVY.

BENCH MARKS:
1323/62 – AN 'X' IN THE NORTH BONNET BOLT OF A FIRE HYDRANT LOCATED N 90° W ON THE MOST SOUTHERLY END OF ENDEAVOR BOULEVARD FOR A DISTANCE OF 186'+/– AND 20'+/– SOUTHEAST OF THE SOUTHEAST SIDE OF A 30' x 124' COVERED AREA (BUILDING #2407).
ELEVATION = 21.63'
1323/62A – A RAILROAD SPIKE IN THE NORTH SIDE OF A LIGHT POLE LOCATED 278'+/– SOUTHWEST OF NORTH LINE OF PROJECT SITE, 12'+/– NORTHWEST OF PROJECT BASE LINE AND BEING S 57° W FOR A DISTANCE OF 443'+/– FROM THE MOST SOUTHERLY END OF ENDEAVOR BOULEVARD.
ELEVATION= 21.58'
1323/62B – A 6" X 6" CONCRETE MONUMENT WITH BRASS DISK STAMPED "CORP OF ENGINEERS U.S. ARMY RP1 YEAR 1963 430'+/– WEST OF THE CENTERLINE OF" LOCATED 69'+/– NORTHWEST OF CONTROL POINT 10 AND 9'+/– SOUTH OF SOUTH LINE OF PROJECT.
ELEVATION = 10.90'
TBM HEADWALL – A SQUARE CUT IN CORNER OF CONCRETE HEADWALL LOCATED AT ELBOW OF DITCH NEAR NORTHEAST CORNER OF BUILDING #2403.
ELEVATION = 12.29'

LEGEND:

FFE	FINISHED FLOOR ELEVATION
INV	INVERT
FL	FLOW LINE
BM	BENCH MARK
ELEV	ELEVATION
CMP	CORRUGATED METAL PIPE
●	1/2" CAPPED IRON ROD SET #7073
■	CONCRETE MONUMENT FOUND
▲	HUB AND TACK SET
⊕	FIRE HYDRANT
⋈	WATER VALVE
⊠	WATER METER
⊠	GAS METER
E	ELECTRIC BOX
⊞	SEWER CLEANOUT
⌘	LIGHT POLE
○	POWER POLE
H	GUARD POST
⌀	BOAT TIE
——18——	CONTOUR LINE
—— E ——	ELECTRIC LINE
—— S ——	STORM SEWER LINE
+12.78	SPOT ELEVATION

Measurements made in accordance with United States Standards.

Bearing Reference STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Elevation Reference FURNISHED
Ordered By SHERRI ERIKSEN
Date of Survey 3-23-06 Date of Plat 9-27-06
Encroachments

A LOCATION OF IMPROVEMENTS AND TOPOGRAPHIC SURVEY OF A PORTION OF NCBC GULF PORT, STENNIS SPACE CENTER P201; RIVERINE TRAINING CENTER

PITTMAN GLAZE AND ASSOCIATES, INC.
LAND SURVEYORS
700 NORTH NINTH AVENUE
PENSACOLA, FLORIDA 32501
(850) 434-6666 FAX (850) 434-6661
EMAIL pgsurvey@bellsouth.net

Source of information STATE PLANE COORDINATE SYSTEM; FURNISHED INFORMATION FROM CLIENT; PUBLIC RECORDS;

I hereby certify that this survey was made under my responsible charge and meets the Minimum Technical Standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17-6, Florida Administration Code, pursuant to Section 472-027, Florida Statutes.

David D. Glaze ☐PSM #5605
Walter J. Glaze ■PSM #6190

SHEET 2 OF 3

LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5579
JOB NO. 32786-06
FB 1323 PG 60-70
FB _____ PG _____

Drawn by PMJ

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\OPERATIONS EAST SURVEY.dwg 06/03/2008 10:15

SEE SHEETS 1 & 2 OF 2 FOR SURVEY IN THIS AREA

GRAVEL ROAD

UNNAMED AGGREGATE ROAD

APPROXIMATE LIMITS OF WOODS

BM 1323/62A
ELEV = 21.58'

TRAVERSE LINE
N 80°32'46" E 384.18'

N 310835.6483
E 732610.9082
Z = 13.36'

INV = 15.98'

INV = 15.91'

LIMITS OF CONCRETE DITCH

CONCRETE DITCH

400.00'

TRAVERSE LINE

S 14°53'08" W

N 310537.8516
E 732343.8412
Z = 7.11'

BM 1323/62B
ELEV = 10.90'

EAST PEARL CANAL
AVERAGE WATER ELEVATION = 2.0'+/-

EAST PEARL CANAL
AVERAGE WATER ELEVATION = 2.0'+/-

NORTH SCALE 1" = 20'

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Measurements made in accordance with United States Standards.

Bearing Reference STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Elevation Reference FURNISHED
Ordered By SHERRI ERIKSEN
Date of Survey 9-23-06
Date of Plat 9-27-06
Encroachments

A LOCATION OF IMPROVEMENTS AND TOPOGRAPHIC SURVEY OF A PORTION OF NCBC GULF PORT, STENNIS SPACE CENTER P201; RIVERINE TRAINING CENTER

PITTMAN, GLAZE AND ASSOCIATES, INC.
LAND SURVEYORS
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PENSACOLA, FLORIDA 32501
(850) 434-6666 FAX (850) 434-6661
EMAIL pgasurvey@bellsouth.net

Source of information STATE PLANE COORDINATE SYSTEM; FURNISHED INFORMATION FROM CLIENT; PUBLIC RECORDS;

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David D. Glaze ☐PSM #5605
Walter J. Glaze ■PSM #6190

SHEET 3 OF 3

LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5580
JOB NO. 32786-06
FB 1323 PG 60-70
FB _____ PG _____
Drawn by PMJ

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\OPERATIONS EAST SURVEY.dwg 06/03/2008 10:13

ATTACHMENT 2

TOPOGRAPHIC SURVEYS

Sheet Pile Wall Area



SURVEYOR'S NOTES:
1. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. THE SURVEYOR DOES NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES OR THAT THEY ARE THE EXACT SIZE, MATERIAL, OR LOCATION AS INDICATED.
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6. FOOTINGS AND FOUNDATIONS BELOW NATURAL GROUND NOT LOCATED.
7. ACCORDING TO CONTRACTORS INSTALLING FIBER OPTIC LINES, THEY WILL ALSO BE INSTALLING ELECTRIC LINES IN SAME TRENCH.
8. COORDINATES SHOWN ARE STATE PLANE COORDINATES REFERENCED TO NAD 83, MISSISSIPPI EAST ZONE AND ARE EXPRESSED IN U.S. SURVEY FEET.

UTILITY COMPANIES:
UTILITY INFORMATION SHOWN AS PER FIELD INFORMATION AND INFORMATION FURNISHED BY UTILITY COMPANIES INVOLVED.
BURIED UTILITIES SHOWN ARE BASED ON INFORMATION FURNISHED BY THE DEPARTMENT OF THE NAVY.

BENCH MARKS:
BM "A" – THE NORTHWEST CORNER OF A CONCRETE SLAB.
ELEVATION = 22.30'
1326/36 – THE MOST NORTHEASTERLY BONNET BOLT OF A FIRE HYDRANT LOCATED NORTHWEST OF THE MOST SOUTHWEST CORNER OF CONCRETE ACCESS ROAD.
ELEVATION = 21.67'
1326/36A – A CONCRETE FOOTER FOR FENCE LOCATED 80'+/– NORTH OF THE MOST SOUTHEAST CORNER OF 8' CHAIN LINK FENCE.
ELEVATION = 25.04'
1326/36B – A CONCRETE FOOTER FOR FENCE LOCATED 40'+/– WEST OF THE MOST SOUTHEAST CORNER OF 8' CHAIN LINK FENCE.
ELEVATION = 20.11

BENCH MARKS:

BM	BENCH MARK
ELEV	ELEVATION
INV	INVERT
CP	CONCRETE PIPE
	PINE TREE
	OAK TREE
	MAPLE TREE
	MISCELLANEOUS TREE
●	1/2" CAPPED IRON ROD SET #7073
×	"X" CUT IN CONCRETE
▲	HUB AND TACK SET
⊞	CONCRETE PILING
	FIRE HYDRANT
	WATER VALVE
	WATER METER
	GAS METER
T	TELEPHONE EQUIPMENT
E	ELECTRIC EQUIPMENT
	SEWER CLEAN OUT
	SOIL BORING
	WATER FAUCET
	LIGHT POLE
	GUY WIRE
	POWER POLE
	SEWER CONNECTION
	WATER CONNECTION
– 8 –	CONTOUR LINE
——×——	CHAIN LINK FENCE
—— T ——	TELEPHONE LINE
—— E ——	ELECTRIC LINE
—— UT ——	BURIED TELEPHONE LINE
—— FO ——	FIBER OPTIC LINE
+7.10	SPOT ELEVATION
	APPROXIMATE LOCATION OF BENCH MARK
F	FIBER OPTIC BOX

Measurements made in accordance with United States Standards.

Bearing Reference STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Ordered By SHERRI ERIKSEN Elevation Reference FURNISHED
Date of Survey 12-18-06 Date of Plat 12-27-06
Encroachments

A LOCATION OF IMPROVEMENTS, TREE LOCATION AND TOPOGRAPHIC SURVEY OF A PORTION OF STENNIS SPACE CENTER P210 RIVERINE & COMBAT CRAFT FACILITY

PITTMAN, PLAZE AND ASSOCIATES, INC.
LAND SURVEYORS
700 NORTH NINTH AVENUE
PENSACOLA, FLORIDA 32501
(850) 434-6666 FAX (850) 434-6661
EMAIL pgasurvey@bellsouth.net

I hereby certify that this survey was made under my responsible charge and meets the Minimum Technical Standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17-6, Florida Administration Code, pursuant to Section 472-027, Florida Statutes.

David D. Glaze ☐PSM #3605
Walter J. Glaze ■PSM #6190

SHEET 1 OF 1
LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5714
JOB NO. 32909-06
FB 1326 PG 26-38
FB ____ PG ____
Drawn by PMJ

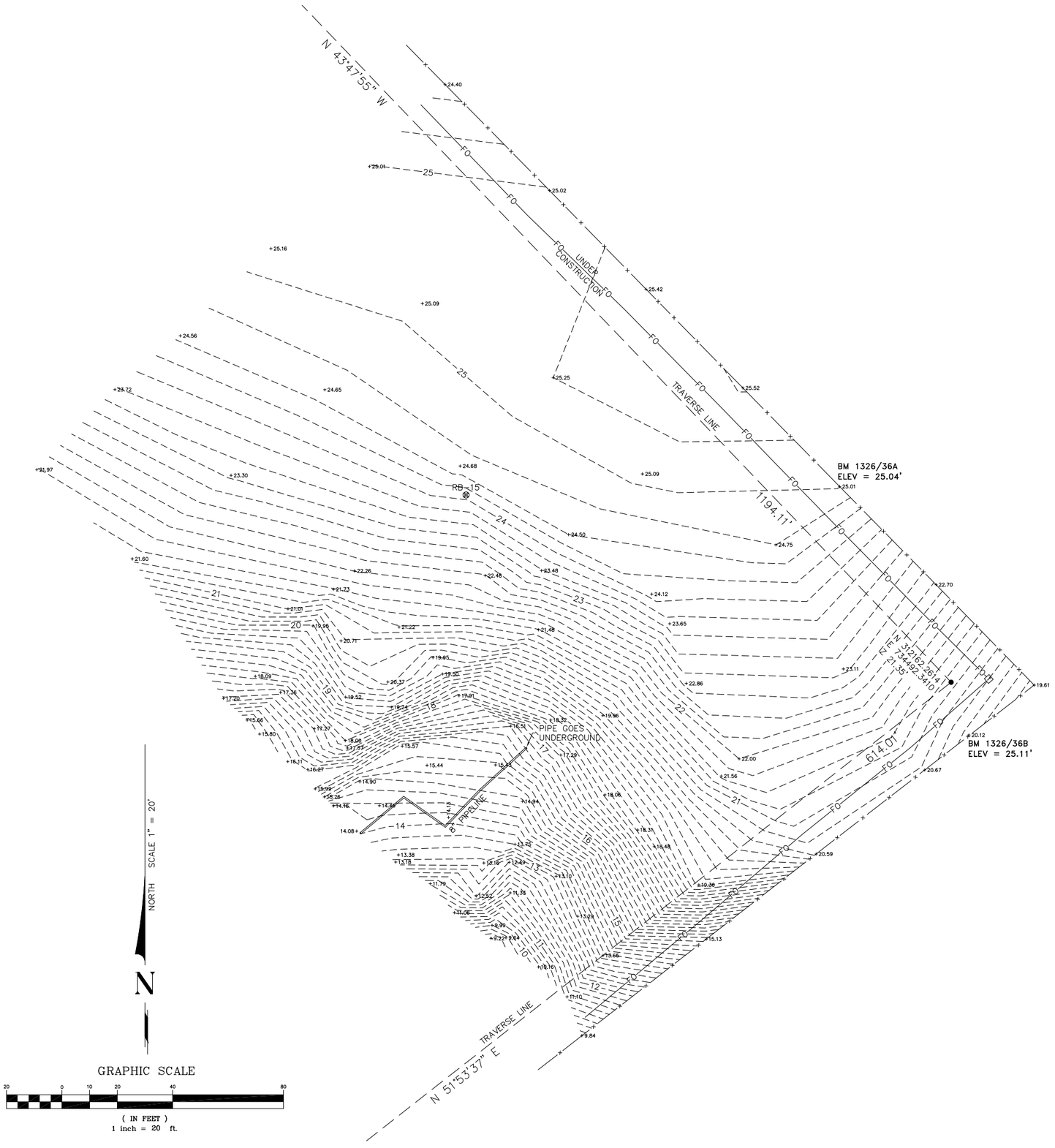
Source of information STATE PLANE COORDINATE SYSTEM; FURNISHED INFORMATION FROM CLIENT; PUBLIC RECORDS;

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\SHEET PILE – HELIPAD SURVEY.dwg 06/03/2008 10:19

ATTACHMENT 2

TOPOGRAPHIC SURVEYS

Helipad Area



SURVEYOR'S NOTES:
1. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. THE SURVEYOR DOES NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES OR THAT THEY ARE THE EXACT SIZE, MATERIAL, OR LOCATION AS INDICATED.
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5. TO ASSURE THE CONTRACTOR IS ON THE SAME VERTICAL AND HORIZONTAL DATUM AS THIS SURVEY, IT IS STRONGLY RECOMMENDED THAT VERTICAL CHECKS BE MADE BETWEEN TWO BENCHMARKS AND THAT HORIZONTAL CHECKS BE MADE BETWEEN THREE CONTROL POINTS OR PROPERTY CORNERS.
6. FOOTINGS AND FOUNDATIONS BELOW NATURAL GROUND NOT LOCATED.
7. ACCORDING TO CONTRACTORS INSTALLING FIBER OPTIC LINES, THEY WILL ALSO BE INSTALLING ELECTRIC LINES IN SAME TRENCH.
8. COORDINATES SHOWN ARE STATE PLANE COORDINATES REFERENCED TO NAD 83, MISSISSIPPI EAST ZONE AND ARE EXPRESSED IN U.S. SURVEY FEET.

UTILITY COMPANIES:
UTILITY INFORMATION SHOWN AS PER FIELD INFORMATION AND INFORMATION FURNISHED BY UTILITY COMPANIES INVOLVED.
BURIED UTILITIES SHOWN ARE BASED ON INFORMATION FURNISHED BY THE DEPARTMENT OF THE NAVY.

BENCH MARKS:
BM "A" – THE NORTHWEST EDGE OF A CONCRETE SLAB.
ELEVATION = 22.30'
1326/36 – THE MOST NORTHEASTERLY BONNET BOLT OF A FIRE HYDRANT LOCATED NORTHWEST OF THE MOST SOUTHWEST CORNER OF CONCRETE ACCESS ROAD.
ELEVATION = 21.67'
1326/36A – A CONCRETE FOOTER FOR FENCE LOCATED 80'+/– NORTH OF THE MOST SOUTHEAST CORNER OF 8' CHAIN LINK FENCE.
ELEVATION = 25.04'
1326/36B – A CONCRETE FOOTER FOR FENCE LOCATED 40'+/– WEST OF THE MOST SOUTHEAST CORNER OF 8' CHAIN LINK FENCE.
ELEVATION = 20.11

BENCH MARKS:

BM	BENCH MARK
ELEV	ELEVATION
INV	INVERT
CP	CONCRETE PIPE
	PINE TREE
	OAK TREE
	MAPLE TREE
	MISCELLANEOUS TREE
●	1/2" CAPPED IRON ROD SET #7073
×	"X" CUT IN CONCRETE
▲	HUB AND TACK SET
⊞	CONCRETE PILING
⊕	FIRE HYDRANT
⋈	WATER VALVE
⊠	WATER METER
⊠	GAS METER
⊟	TELEPHONE EQUIPMENT
E	ELECTRIC EQUIPMENT
⊠	SEWER CLEAN OUT
⊗	SOIL BORING
⊞	WATER FAUCET
☼	LIGHT POLE
———	GUY WIRE
○	POWER POLE
▲	SEWER CONNECTION
▲	WATER CONNECTION
– – 8 – –	CONTOUR LINE
——×——	CHAIN LINK FENCE
—— T ——	TELEPHONE LINE
—— E ——	ELECTRIC LINE
—— UT ——	BURIED TELEPHONE LINE
—— FO ——	FIBER OPTIC LINE
+7.10	SPOT ELEVATION

Measurements made in accordance with United States Standards.

Bearing Reference STATE PLANE COORDINATE SYSTEM NAD 83 (GRID NORTH)
Ordered By SHERRI ERIKSEN Elevation Reference FURNISHED
Date of Survey 12-18-06 Date of Plat 12-27-06
Encroachments

A LOCATION OF IMPROVEMENTS, TREE LOCATION AND TOPOGRAPHIC SURVEY OF A PORTION OF STENNIS SPACE CENTER P210 RIVERINE & COMBAT CRAFT FACILITY

PITTMAN, PLAZE & ASSOCIATES, INC.
LAND SURVEYORS
700 NORTH NINTH AVENUE
PENSACOLA, FLORIDA 32501
(850) 434-6666 FAX (850) 434-6661
EMAIL pgasurvey@bellsouth.net

I hereby certify that this survey was made under my responsible charge and meets the Minimum Technical Standards as set forth by the Florida Board of Professional Land Surveyors in Chapter 61G17-6, Florida Administration Code, pursuant to Section 472-027, Florida Statutes.

David D. Glaze ☐PSM #3605
Walter J. Glaze ■PSM #6190

SHEET 1 OF 1
LB No. 7073
NOT VALID UNLESS IMPRINTED WITH EMBOSSED SEAL AND SIGNED BY SURVEYOR

SCALE 1" = 20'
FILE NO. C-5715
JOB NO. 32909-06
FB 1326 PG 26-38
FB ____ PG ____
Drawn by PMJ

Source of information STATE PLANE COORDINATE SYSTEM; FURNISHED INFORMATION FROM CLIENT; PUBLIC RECORDS;

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\SHEET PILE – HELIPAD SURVEY.dwg 06/03/2008 10:20

ATTACHMENT 3

WATER FLOW TEST

URS Corporation
7650 West Courtney Campbell Causeway
Tampa, Florida 33607
(813) 286-1711

HYDRANT FLOW TEST REPORT

Project:
Riverine Training Facility Stennis Space Center

Location of static/residual hydrant:
#9

Location of flow hydrants:
#9-A

Test date:
7-jun-06

Test time:
1:00 pm

Test personnel:
Charles Davis/URS

Size of tested main:_____

Nozzle size: 2 ½"

Discharge coefficient: .9

Static pressure: 68 (PSI) Residual pressure: 56 (PSI)

Flow hydrant A pitot reading: Flow: 1025 (GPM)

Flow hydrant B pitot reading Flow: _____ (GPM)

Flow Hydrant C pitot reading Flow: _____ (GPM)

Total flow 1025 (GPM)

Comments:_____

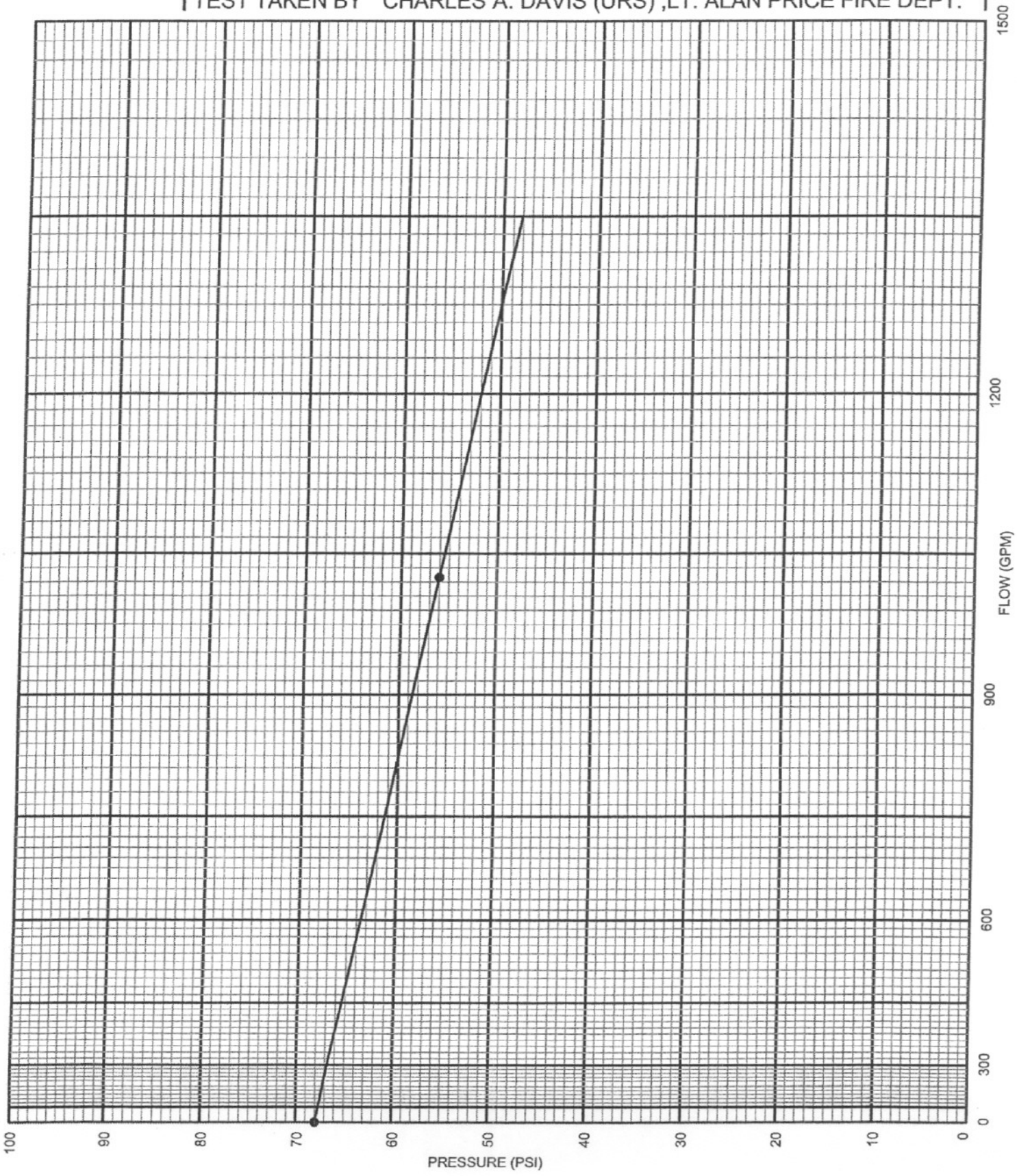
2-8-07

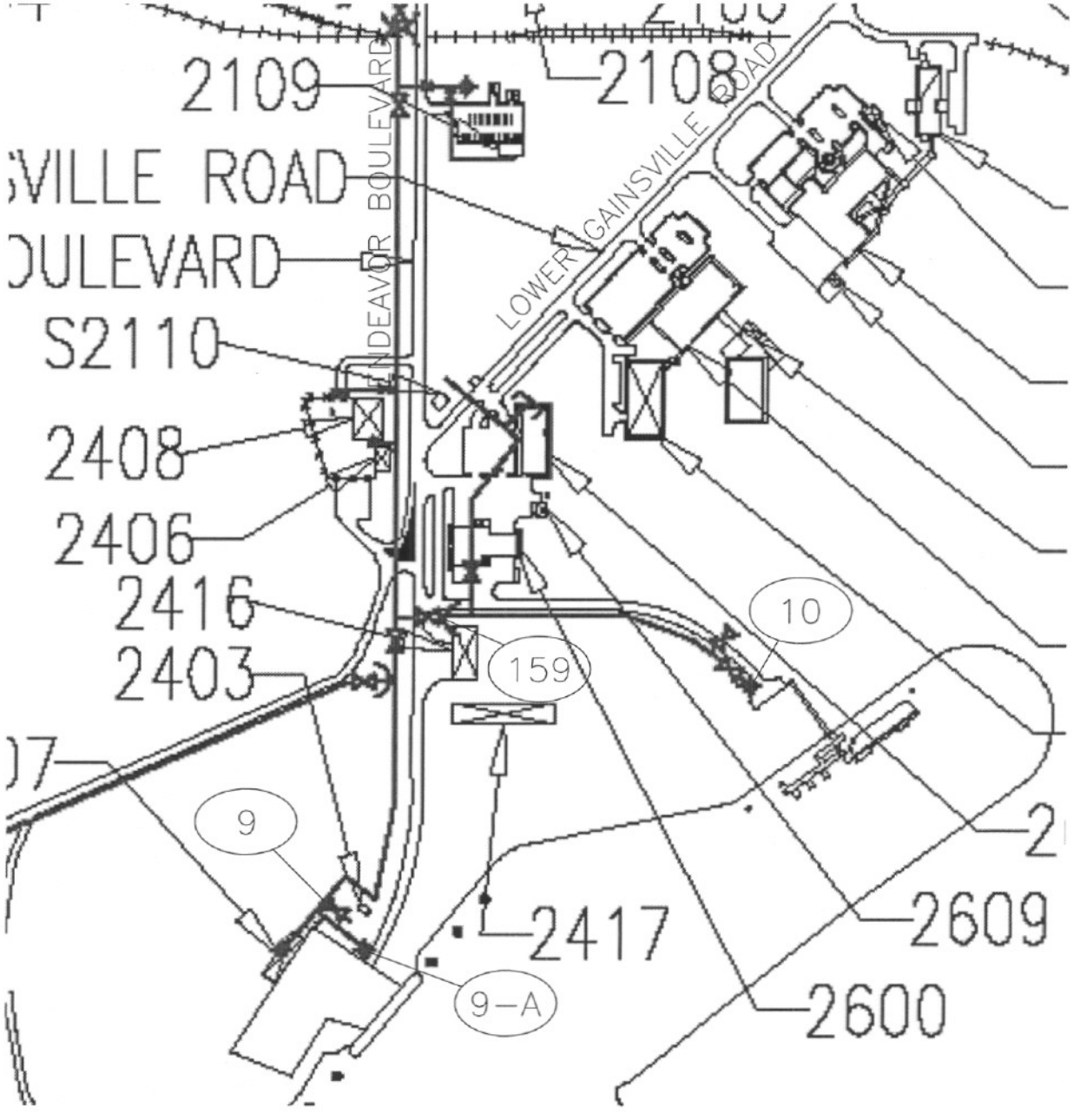
Charles A. Davis, P.E.
FL. Reg. No. 45847

URS

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
No. 00000002

PROJECT RIVERINE TRAINING FACILITY STENNIS SPACE CENTER
PROJECT NO. P-210
TEST DATE 7-JUN-06 TEST TIME 13:00 HOURS
TEST LOCATION HYD.#9
NOZZLE SIZE 2 1/2" DISCH. COEF. .9 FLOW 1025 (GPM)
STATIC PRESSURE 68 PSI RESIDUAL PRESSURE 56 PSI
TEST TAKEN BY CHARLES A. DAVIS (URS) ;LT. ALAN PRICE FIRE DEPT.





RIVERINE TRAINING FACILITY

N

URS

GRAPHIC SCALE

N.T.S.

STENNIS SPACE CENTER GULFPORT, MS RIVERINE TRAINING FACILITY		RIVERINE TRAINING FACILITY FIRE FLOW TEST LOCATION	SHEET 1

T:\Stennis Fire Flow Test\2ND FLOW TEST\PK-FT2 SK LOCATION.dwg 04/23/2007 15:20

ATTACHMENT 4

GEOTECHNICAL REPORTS

January 12, 2007 Southern Earth Sciences Report

March 26, 2008 Southern Earth Sciences Report

(Note: The second geotechnical report was prepared after additional investigations were performed due to resiting of the Operations Building, Maintenance and Storage Complex. There have been additional minor adjustments in facility locations since the report was completed.)

ATTACHMENT 4

GEOTECHNICAL REPORTS

January 12, 2007 Southern Earth Sciences Report

Mobile, AL

762 Downtowner Loop West
P.O. Box 160745
Mobile, AL 36616

Tel.: (251) 344-7711
Fax: (251) 341-9488
www.soearth.com

SOUTHERN EARTH SCIENCES, inc.
Geotechnical &
Environmental
Consultants

January 12, 2007

URS GROUP, INC.
7650 West Courtney Campbell Causeway
Tampa, FL 33607

ATTENTION: Mr. Fred Walker, P.E.

REFERENCE: Proposed Riverine and Combat Craft
Operations Facility, Project No. P-210
Stennis Space Center
Hancock County, Mississippi
SESI Project M06-469

Dear Mr. Walker:

Southern Earth Sciences, Inc., has completed the subsurface exploration and engineering studies and analyses for the above referenced project. Authorization to proceed was given us by you. The following report provides a discussion of the development, exploration procedures used, subsurface conditions encountered, considerations for site preparation, and foundation recommendations.

SITE DESCRIPTION

Riverine Training Facility

The area is bound by wooded areas to the north, south and west, and an unnamed tributary (canal) of the Pearl River to the east. At the time of our investigation, we noted the site was partially wooded with moderate underbrush and contained a number of pieces of mobile utility equipment. In addition, an open shed and several small temporary structures were noted along the north and west areas of the site. The topography varied approximately from Elevation 21.57 to the meanderings of the canal shoreline at Elevation 0.0.

Bulkhead

The site is bound by open areas to the north and west, a wooded area to the south and the aforementioned canal to the east. At the time of our investigation, we noted the site was clear. The topography varied approximately from Elevation 5.0 to the meanderings of the canal shoreline at Elevation 0.0.

Helicopter Landing Area

The site is essentially surrounded by wooded areas. At the time of our investigation, we noted the site had been recently cleared and installation of underground utilities appeared to be in progress. The topography varied approximately from Elevation 25.4 to Elevation 1.3.

All elevations, as noted above, are approximate and are based on a drawing provided by URS Corporation titled Boring Location Plan, Riverine and Combat Craft Operations Facility, dated November 29, 2006.

GEOLOGIC SETTING

The site is located in the southern, lower, Gulf Coastal Plain physiographic province of Mississippi. Soils encountered and sedimentary deposits are primarily from the Holocene period, and consist of loam, sands, gravels and clay of the Coastal Deposits formation.

PROJECT INFORMATION

It is our understanding that the Riverine Facility project will consist of a one- to two-story building of steel and masonry construction with a concrete floor slab on grade. For the purpose of this report, we have assumed design column loads of 200 kips and maximum wall loads of 8 kips per lineal foot, as no structural loads were provided. In addition, we have assumed that the total thickness of fill used to achieve the desired final subgrade elevation will be limited to approximately 2 feet.

In the area to the north, we understand a bulkhead type retaining wall will be constructed along the canal shoreline and a helicopter landing pad will be placed on grade in an open area.

FIELD INVESTIGATIVE PROCEDURES

On December 19 through 22, 2006, we performed fifteen (15) split-spoon sample soil borings in locations and to depths as directed. The boring locations were staked in the field by your firm prior to the arrival of the drilling equipment. A Test Location Plan showing the approximate locations of the borings are included in **APPENDIX A**.

The soil borings with Standard Penetration Tests (SPT) were advanced to depths of 16½ to 61½ feet using track-mounted, mud-rotary type drilling equipment. All samples obtained in the field were returned to our laboratory and visually classified in accordance with the Unified Soil Classification System. Logs for the soil borings are attached to this report in **APPENDIX B**.

LABORATORY TESTING

In order to define the soil properties more closely, classification tests were performed on selected samples obtained in the borings. A summary of the test data is included in **APPENDIX C**.

SUBSURFACE CONDITIONS ENCOUNTERED

Subsurface conditions for each area will be discussed separately. All references to depth are made with respect to the existing ground surface at the time the borings were performed.

Riverine Training Facility

A review of the subsurface conditions shows loose to medium sands with varying root content to 2 feet, followed by loose to very dense sand and clayey sand interlaced with medium to very stiff clays to depths of 13 to 18 feet. This was underlain by loose to very dense sands to 38 to 42 feet and soft to medium clay to the depth of the exploration at 61½ feet. The only notable exceptions occurred in Boring No. RB-8, which showed a stratum of soft clay from 13 feet to its termination depth at 16½ feet, and Boring No. RB-12, which displayed a similar layer from 4½ to 7 feet.

Bulkhead

Subsurface conditions encountered in the borings were similar. Essentially, underlying the surface soils with varying root content, loose to medium sand and clayey sand was exhibited to the depths of the borings at 26½ feet.

Helicopter Landing Area

Boring No. RB-15 showed loose sand to 2 feet, followed by very stiff clay to 4½ feet, medium to very dense sand and clayey sand to 13 feet, very soft clay to 17 feet, and medium sand to the depth of the boring at 21½ feet.

It is noted; traces of wood were encountered at various depths in Boring Nos. RB-5, RB-11, RB-12, and RB-13. Inspection of this material in our laboratory indicated it may be the remnants of tree stumps; and, due to their depth, should be of no concern.

At the site of the Riverine Training Facility, the ground water table was found to vary from 5.8 feet below the existing ground surface in Boring No. RB-1 to 17 feet below existing grade in Boring No. RB-3, with most of the remaining borings showing water tables to a depth of at least 10 feet. The most likely reason for the relatively shallow measurement in Boring RB-5 is due to the low permeability of the shallow layers of soil, resulting in possible retention of the drilling water. In the area of the Proposed Bulkhead, the ground water was noted at 1.5 feet below grade, which would be expected due to their close proximity to the canal. In Boring No. RB-15, in the vicinity of the planned Helicopter Landing Area, the water table was noted at a depth of 15.4 feet below grade.

It must be noted that fluctuations in the level of the ground water table may occur due to rainfall, elevation, drainage, tides, temperature and other factors not evident at the time measurements were made. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on such assumptions of variation.

USDA NRCS SOILS CLASSIFICATION

Based on information obtained from the Natural Resource Conservation Service of the United States Department of Agriculture, the predominant soil classes at these sites are the Atmore silt loam (At), Harleston fine sandy loam (H1a), and the Plummer loamy sand (Pm). Summaries of the soil surveys for these sites are included in **APPENDIX D**.

EXPANSIVE SOIL CHARACTERISTICS

As previously mentioned, the upper strata of soils at these sites were primarily sands. In areas where clays were evident at shallow depths, results of Atterberg Tests performed on selected samples indicate that these soils showed little potential for volume change under conditions of varying moisture content. With regards to Section 1802.3.2 of the 2003 Edition of the International Building Code (IBC), clays and clayey soils encountered at relatively shallow depths do not exhibit the characteristics of expansive soils.

SEISMIC CONSIDERATIONS

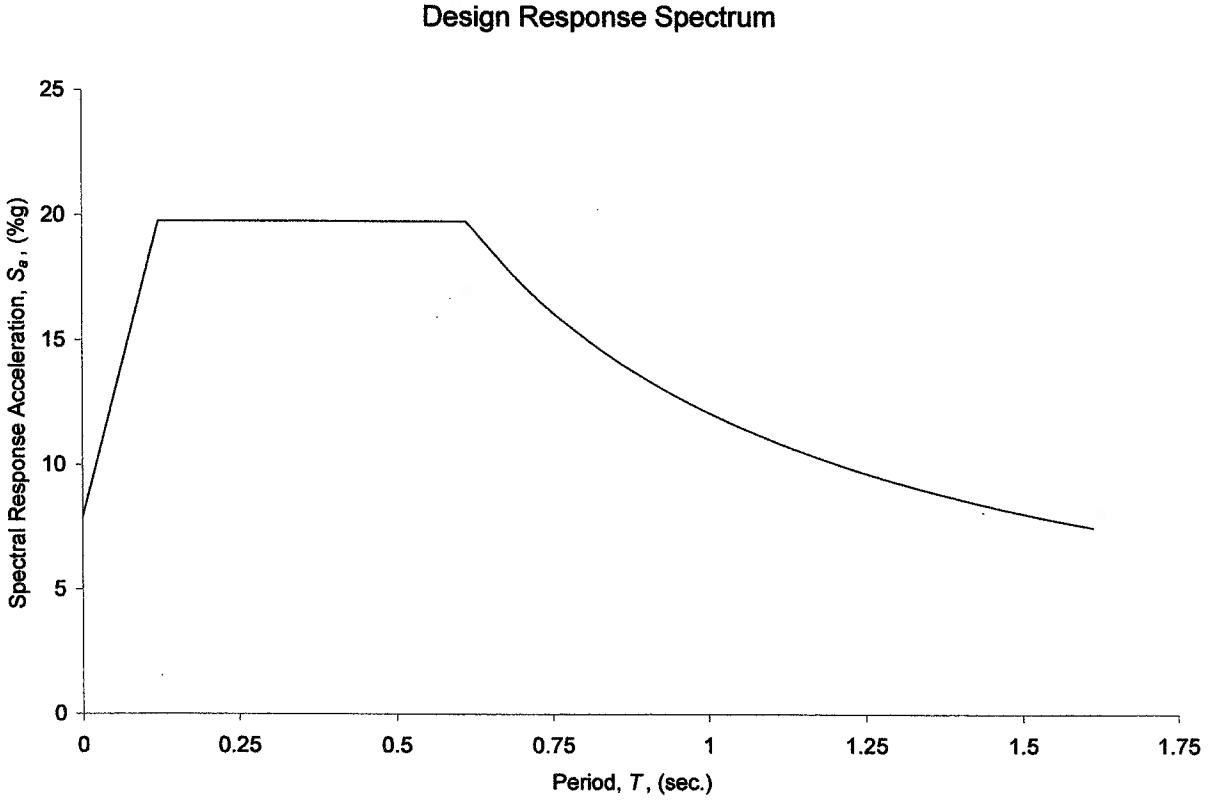
Based on the subsurface conditions encountered, with reference to Table 1615.1.1 of the IBC, these sites would best be categorized as **Site Class "E"**. It is noted, borings for this project were performed to a maximum depth of 61½ feet and the IBC normally requires soil information to a depth of 100 feet be used in site classification. In Section 1615.1.1, however, it states that appropriate soil properties can be estimated by a registered design professional if site-specific data is not available. Data available in our files from previous projects near this site was used for this purpose.

In accordance with Sections 1615.1.2, 1615.1.3, and 1615.1.4 of the IBC, design parameters were calculated for an earthquake having a 2% probability of exceedence in a 50-year period using seismic data available from the United States Geological Survey (USGS). The results of these calculations, expressed as a percent of the gravitational force (g) are as follows:

Five-Percent Damped Design Spectral Response Acceleration Parameters

Short Periods (0.2 sec)	S_{DS} = 19.77 %g
1-Second Periods	S_{D1} = 12.11 %g

Based on the IBC Site Class and the above seismic data, a typical spectral response curve for this site was developed and is shown below:



FOUNDATION ANALYSIS

Riverine Training Facility

Since this is the only area where a structure will be built, this section will address the conditions as encountered in Borings RB-1 through RB-12. Further, comments and recommendations as provided in the following paragraphs will apply only to this particular part of the project.

A review of the subsurface conditions encountered shows that beneath the very loose to medium surface sands with varying root content, soils of reasonable density and consistency were evident to a depth of at least 13 feet. Calculations indicate that stresses from shallow foundations would

be effectively dissipated prior to reaching these questionable strata. Based on these conditions and the assumed design data, this structure could be supported on shallow foundations.

It is noted; as previously mentioned, Boring RB-12 revealed a layer of weak clay at a relatively shallow depth. We have assumed that the location of this boring is not in the area of the proposed building, therefore the existence of this potentially compressible soil would not be considered critical.

Bulkhead

Based on the results of the field exploration, approximated soil properties for Boring Nos. B-13 and B-14 are shown below in TABLES I and II:

TABLE I

APPROXIMATE SOIL PROPERTIES
BORING B-13

Depth Interval (feet below grade)		*Unit Weight (γ) (pcf)*	*Friction Angle (Φ) (deg)*	*Cohesion (c) (psf)*
0	5	110	27	0
5	10	120	30	0
10	13	110	27	0
13	25	120	30	0

TABLE II

APPROXIMATE SOIL PROPERTIES
BORING B-14

Depth Interval (feet below grade)		*Unit Weight (γ) (pcf)*	*Friction Angle (Φ) (deg)*	*Cohesion (c) (psf)*
0	8	110	27	0
8	25	120	30	0

SUBGRADE PREPARATION

Initially, the existing structures should be demolished and removed. The site should be cleared, grubbed, and stripped of all soils containing roots and organic matter and any remnants of the previous structure, including old foundations, pavements, utility lines, etc. Topsoil and other organic laden soils obtained during site stripping operations could be stockpiled on site for reuse in landscaped areas and on the sides of roads. The remaining surface soils should be thoroughly and uniformly compacted in place, and any soft or unstable soils encountered should be removed. Thoroughly compacted backfill and fill should then be placed to the desired subgrade elevations.

Backfill and Fill

Backfill and Fill material should be non-plastic and granular in nature with a maximum of 20% passing the Wash 200 Sieve. It should be placed in thin successive layers 8" to 10" loose measurement and each layer should be compacted to at least 95% of its maximum laboratory dry density, within ±2% of its optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). In-place field density tests should be performed as this material is being placed and compacted in order to insure that required density is being achieved. Since these testing services are within the scope of our activities, we urge that our firm be retained to assist you during the earthwork phase of this project.

RECOMMENDATIONS

Footings

We would recommend that footings be designed for a maximum net allowable unit soil pressure of 2,000 pounds per square foot in order to minimize post-construction settlement. Bearing depths should be a minimum of 18 inches below finished grade. Based on the assumed design data and this maximum soil pressure, total settlement of the foundations would not be expected to exceed 1 inch, approximately 50% of which could be differential between interior columns and load bearing walls.

Concrete Floor Slabs

After the subgrade has been prepared as outlined, conventionally designed concrete slabs could be placed on grade. These slabs should be appropriately jointed such that minor differential movement does not cause excessive distortion or damage. For design purposes, a modulus of subgrade reaction (k) of 250 pounds per cubic inch (pci) could be used.

Pavement Design Data

Bulk samples were obtained at several locations for California Bearing Ratio (CBR) testing. The results of these tests and corresponding estimates of modulus of subgrade reaction (k) are shown below in TABLE III:

TABLE III
DESIGN DATA

Location	*Boring No.*	*CBR*	*k*
Riverine Training Facility	RB-2	32.2	300 pci
	RB-3	1.1	N/A
Helicopter Landing Area	RB-15	40.5	375 pci

It is noted; the sample in the vicinity of RB-3 appeared to contain a higher amount of organic material than those from other areas of the site. Although the samples were sieved to remove as much of this deleterious material as practicable, it is our opinion that the results of this test were affected by this material.

For design purposes, we would recommend that a subgrade modulus (*k*) value of 225 pci and a CBR of 15 be used for roads, paved parking areas, and the helicopter lading pad.

GENERAL COMMENTS

The soil samples obtained during the subsurface investigation will be retained for a period of 6 months from the date of this report. If no instructions are received, they will be disposed of at that time.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based on the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated boring location and on the particular date drilled.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering works and judgments rendered meet the standard of care of our profession.

This report has been prepared in order to aid in the evaluation of this project and to assist the architects and engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

As the project geotechnical engineer of record that developed the foundation design recommendations, please be aware that we cannot accept responsibility for the performance of the foundation system if we are not afforded the opportunity to confirm that our recommendations have been followed. Accordingly, we recommend that Southern Earth Sciences, Inc. be retained on this project to perform observation and field-testing services during the construction phase of the foundation system.

This report is exclusively for the use and benefit of the addressee(s) identified on the first page of this report and is not for the use or benefit of, nor may it be relied upon by any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the addressee(s) hereof without, in each case, the advance written consent of the undersigned.

We appreciate the opportunity to serve you on this project. If you have any questions or if we may be of further assistance, please call at your convenience.

Very truly yours,

SOUTHERN EARTH SCIENCES, INC.



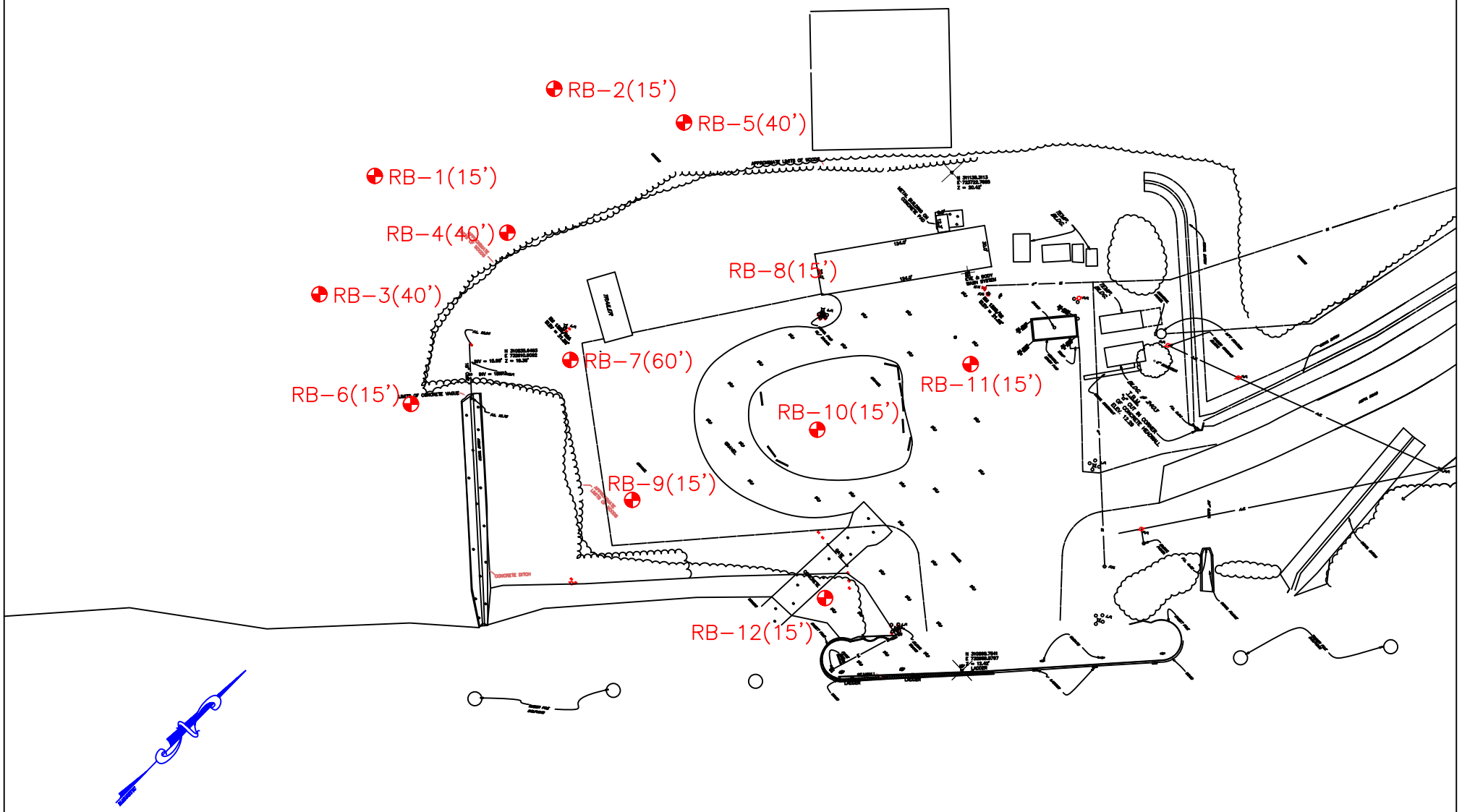
R. Graham Forsythe, P.E.
Registered, Mississippi 16515

RGF/rf

Enclosures

APPENDIX A

TEST LOCATION PLANS



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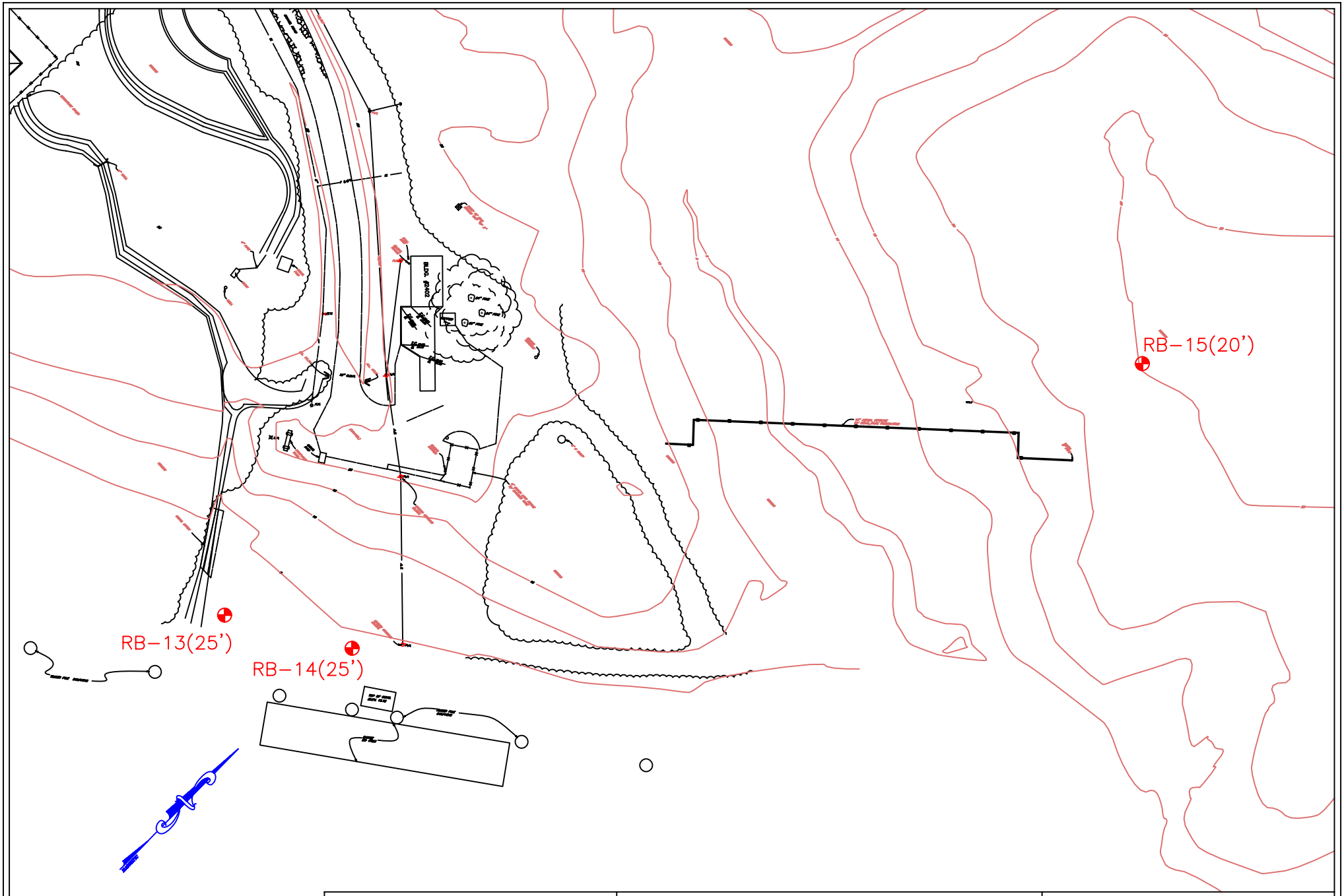
SCALE, IN FEET

RIVERINE AND COMBAT
CRAFT OPERATIONS FACILITY
PROJECT P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MS

SOUTHERN EARTH SCIENCES, inc.

www.soearth.com

TEST LOCATION PLAN
RIVERINE TRAINING FACILITY
PAGE 1 OF 2
SESI PROJECT M06-462



-100 -50 0 100

SCALE, IN FEET

RIVERINE AND COMBAT
CRAFT OPERATIONS FACILITY
PROJECT P-210
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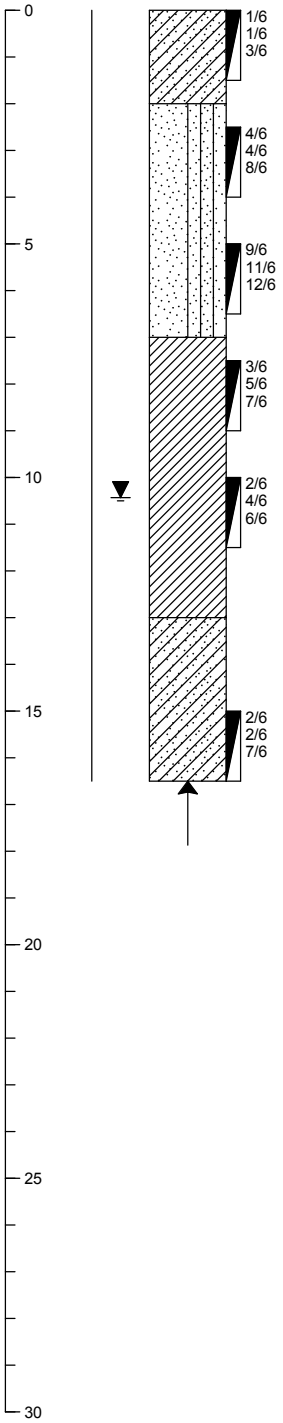
TEST LOCATION PLAN
BULKHEAD AND HELO PAD
PAGE 2 OF 2
SESI PROJECT M06-462

APPENDIX B

BORING LOGS

SOIL BORING LOG

BORING NO.: RB-1
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/19/06 **DATE COMPLETED:** 12/19/06
WATER LEVEL: 10.5 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



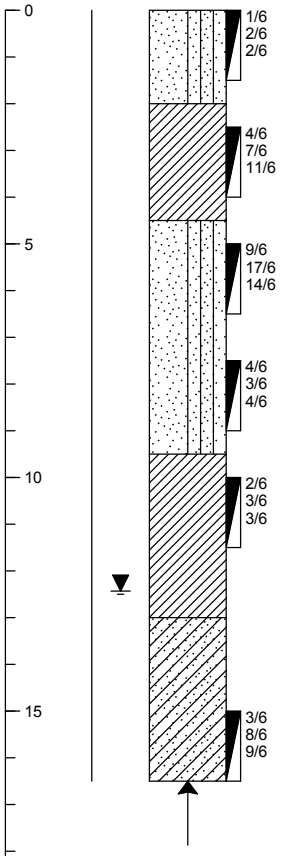
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SC	Very Loose Tan & Yellow Clayey Fine SAND with Some Organics	4		
		SP-SM	Medium Brown & Tan Fine SAND with Some Silt	12		
				23		
		CL	Medium Orange & Gray CLAY with Little Sand	12	18.2	66
				10		
		SC	Loose Gray & Yellow Fine Clayey SAND			
				9	22.8	43

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-2
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/20/06 **DATE COMPLETED:** 12/20/06
WATER LEVEL: 12.5 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



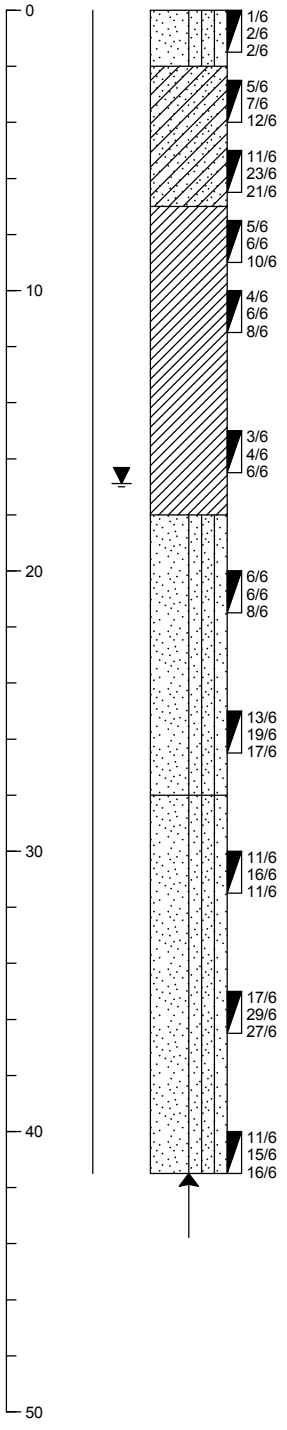
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SP-SM	Very Loose Tan & Orange Fine SAND with Some Silt & Organics	4		
		CL	Stiff Orange CLAY with Some Sand	18	17.2	73
		SP-SM	Loose to Dense Orange & Gray Fine SAND with Some Silt	31		
				7		
		CL	Medium Orange & Gray CLAY with Little Sand	6		
		SC	Medium Tan Fine Clayey SAND	17		

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-3
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/19/05 **DATE COMPLETED:** 12/19/06
WATER LEVEL: 17 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SP-SM	Loose Tan Fine SAND with Some Silt & Organics	4		
		SC	Medium to Dense Gray & Yellow Fine Clayey SAND	19	15.9	46
				44		
		CL	Stiff to Very Stiff Yellow & Gray CLAY with Trace Sand	16		
				14		
				10		
		SP-SM	Medium to Dense Gray, Orange & Tan Fine SAND with Some Silt	14		
				36		
		SP-SM	Dense to Very Dense Tan & Dark Brown Fine SAND with Some Silt	27	20.8	8
				56		
				31		

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-4
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/20/06 **DATE COMPLETED:** 12/20/06
WATER LEVEL: NOT MEASURED **WATER LEVEL DATE:**
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF

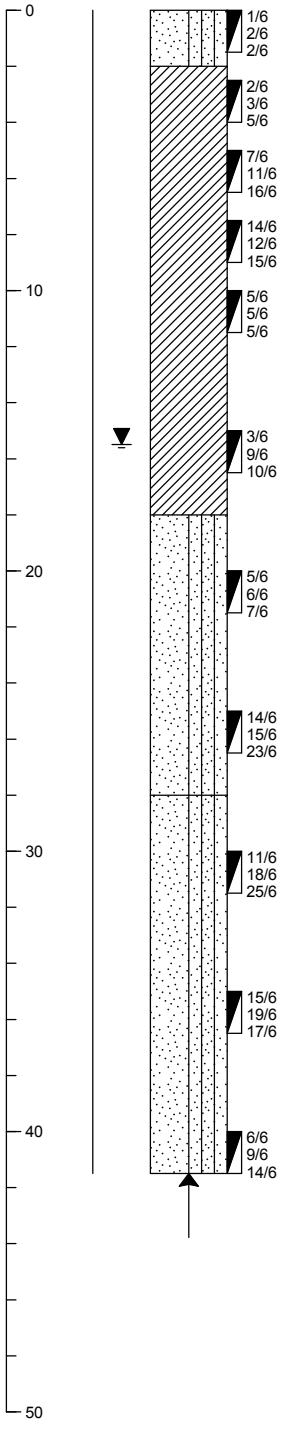
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0	2/6 1/6 3/6	SP-SM	Loose Tan & Gray Fine SAND with Some Silt & Organics	4		
	4/6 3/6 4/6	SC	Loose to Medium Tan, Gray & Yellow Clayey Fine SAND	7		
	6/6 7/6 9/6			16	14.2	31
	2/6 3/6 4/6	CL	Medium Gray & Orange CLAY with Trace Sand	7		
10	2/6 2/6 3/6			5		
	7/6 6/6 9/6	SP-SM	Medium to Dense Gray, Tan & Brown Fine SAND with Some Silt	15		
20	10/6 14/6 14/6			28		
	5/6 9/6 19/6			28		
30	10/6 19/6 26/6			45		
	9/6 11/6 7/6			18		
		CL	Soft Gray CLAY with Trace Sand			
40	1/6 1/6 3/6			4		
50						

Remarks: Ground water table not measured due to collapse of borehole.

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-5
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/20/06 **DATE COMPLETED:** 12/20/06
WATER LEVEL: 15.6 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



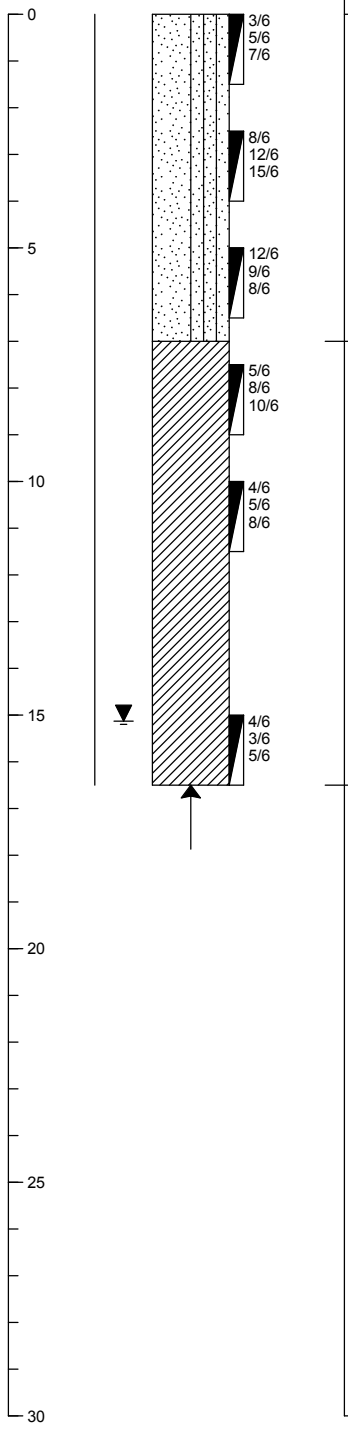
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SP-SM	Loose Orange Fine SAND with Some Silt & Organics	4		
		CL	Medium to Stiff Gray & Orange CLAY with Some Sand	8		
				27		
				27		
				10	26.8	71
				19		
		SP-SM	Dense Gray Fine SAND with Some Silt & Traces of Wood	13		
				38		
		SP-SM	Medium to Dense Tan & Gray Fine SAND with Some Silt	43		
				36		
				23		

Remarks: Presence of wood noted in the sample at 25'.

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-6
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/20/06 **DATE COMPLETED:** 12/20/06
WATER LEVEL: 15.2 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF

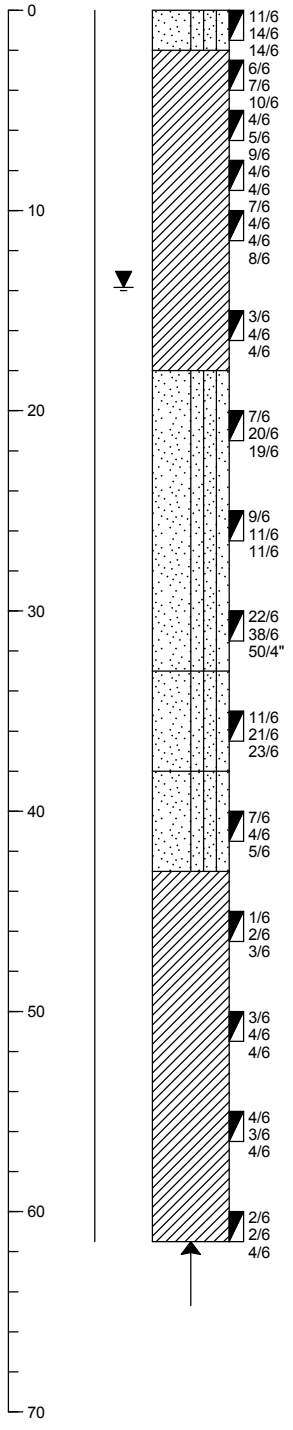


Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
		SP-SM	Medium Tan Fine SAND with Some Silt	12
				27
				17
		CL	Stiff to Very Stiff Orange and Gray CLAY with Trace Sand	18
				13
				8

Remarks:

SOIL BORING LOG

BORING NO.: RB-7
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/18/06 **DATE COMPLETED:** 12/18/06
WATER LEVEL: 14 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



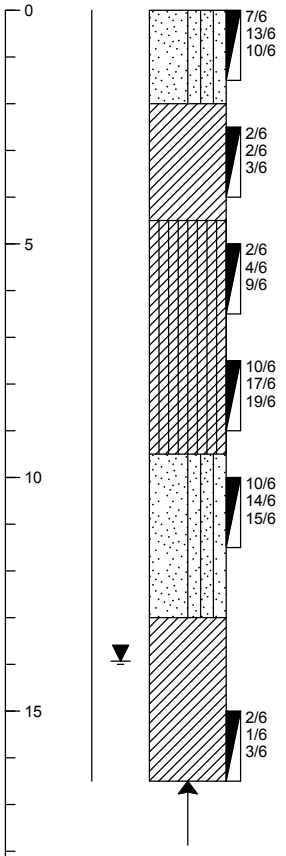
Elevation / Depth	USCS	Description	SPT N	NM %	LL %	200 %
	SP-SM	Medium Orange Fine SAND with Some Silt	28			
	CL	Stiff to Very Stiff Gray CLAY with Trace Sand	17	19.8	29	95
			14			
			11			
			12			
			8			
	SP-SM	Medium to Very Dense Tan & Orange Fine SAND with Little Silt	39			
			22	19.0		6
			50/4"			
	SP-SM	Dense Brown Fine SAND with Some Silt & Gravel	44			
	SP-SM	Loose Gray Fine SAND with Some Silt	9			
	CL	Medium Gray CLAY with Trace Sand	5			
			8			
			7			
			6			

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462-~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-8
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/20/06 **DATE COMPLETED:** 12/20/06
WATER LEVEL: 14 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF

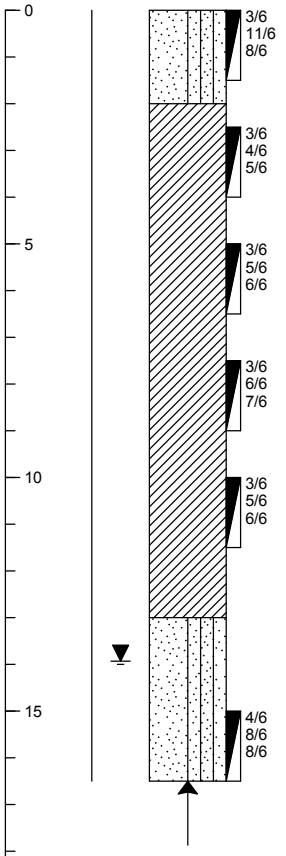


Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SP-SM	Medium Tan Fine SAND with Some Silt	23			
		CL	Medium Orange CLAY with Trace Sand	5	56.8	20	97
		CL-ML	Stiff to Very Stiff Gray CLAYEY SILT with Some Sand	13	15.5	19	57
		SP-SM	Dense Tan & Gray Fine SAND with Some Silt	36 29			
		CL	Soft Gray & Tan CLAY with Trace Sand	4			

Remarks:

SOIL BORING LOG

BORING NO.: RB-9
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/18/06 **DATE COMPLETED:** 12/18/06
WATER LEVEL: 14 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF

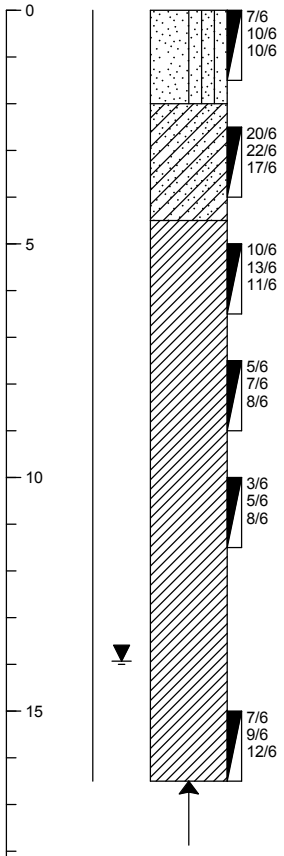


Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SP-SM	Medium Gray & Orange Fine SAND with Some Silt and Gravel	19			
		CL	Medium Gray CLAY with Little Sand	9	19.8	35	98
				11			
				13			
				11			
		SP-SM	Medium Tan & Orange Fine SAND with Some Silt				
				16			

Remarks:

SOIL BORING LOG

BORING NO.: RB-10
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/18/06 **DATE COMPLETED:** 12/18/06
WATER LEVEL: 14 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



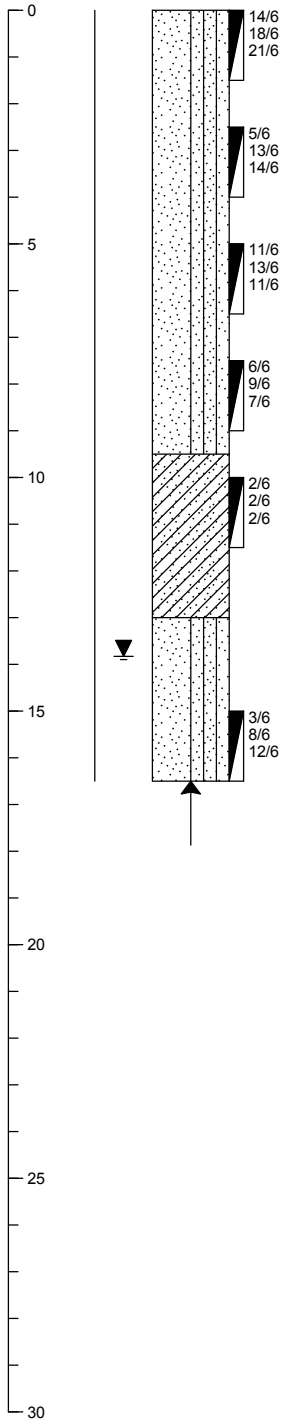
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SP-SM	Medium Tan & Orange Fine SAND with Some Silt	20		
		SC	Dense Tan & Orange Clayey Fine SAND	39		
		CL	Stiff to Very Stiff Gray CLAY with Trace Sand	24	14.5	71
				15		
				13		
				21		

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-11
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/18/06 **DATE COMPLETED:** 12/18/06
WATER LEVEL: 13.9 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



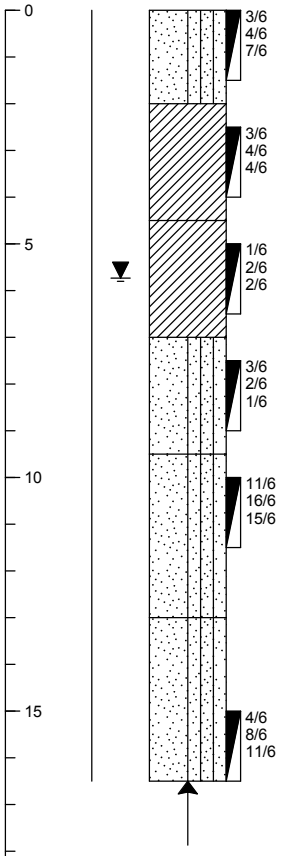
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
0		SP-SM	Medium to Dense Tan & Orange Fine SAND with Some Silt	39
				27
5				24
				16
10		SC	Loose Gray Clayey SAND with Traces of Wood	4
		SP-SM	Medium Tan Fine SAND with Some Silt	
15				20
20				
25				
30				

Remarks: Presence of wood noted in the sample at 10'.

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-12
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/22/06 **DATE COMPLETED:** 12/18/06
WATER LEVEL: 5.8 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



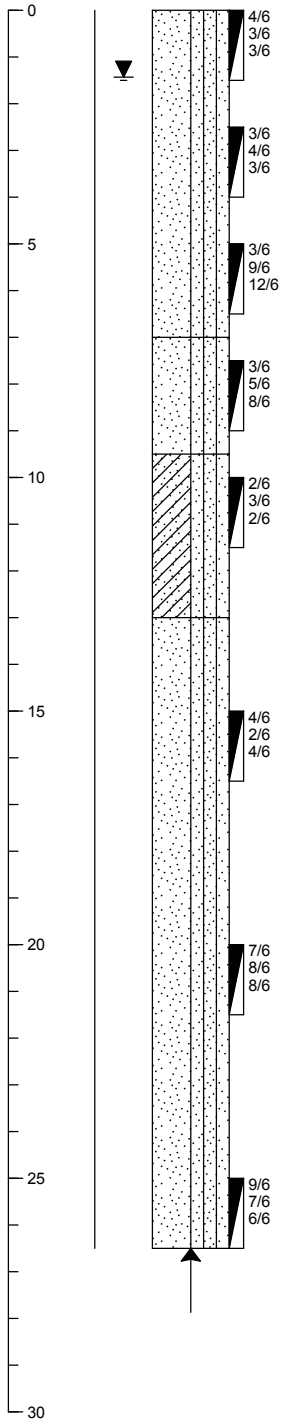
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SP-SM	Medium Orange and Gray Fine SAND with Some Silt	11			
		CL	Medium Gray CLAY with Some Sand	8	16.2	24	68
		CL	Soft Gray CLAY with Traces of Wood	4			
		SM	Very Loose Gray SAND with Some Silt	3			
		SP-SM	Dense Gray & Tan SAND with Some Silt and Wood	31			
		SP-SM	Medium Tan & Orange Fine SAND with Some Silt	19			

Remarks: Presence of wood noted in the samples at 5" & 10'.

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-13
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/18/06 **DATE COMPLETED:** 12/22/06
WATER LEVEL: 1.5 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF

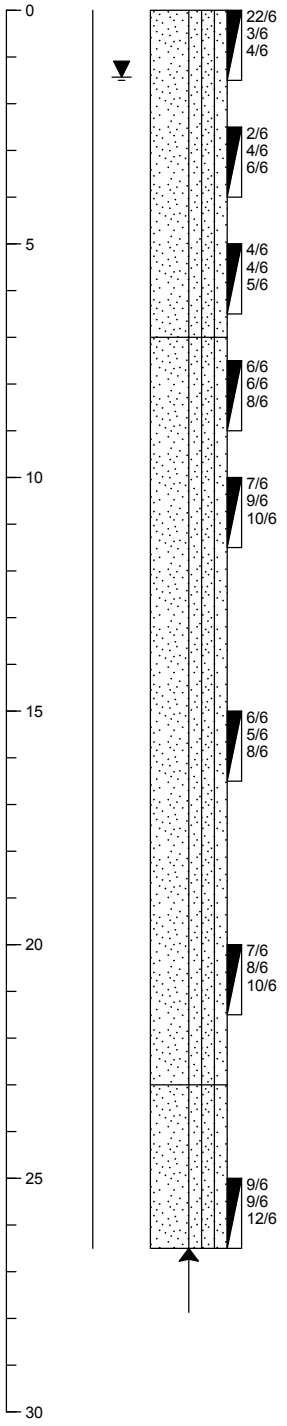


Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SP-SM	Loose to Medium Tan & Brown Fine SAND with Some Silt	6			
				7			
				21			
		SP-SM	Medium Tan Fine SAND with Some Silt and Traces of Wood	13			
		SC-SM	Loose Gray Clayey, Silty SAND with Organics	5	28.2	22	42
		SP-SM	Loose to Medium Tan Fine SAND with Some Silt	6			
				16			
				13			

Remarks: Presence of wood noted in the sample at 7.5'.

SOIL BORING LOG

BORING NO.: RB-14
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/22/06 **DATE COMPLETED:** 12/22/06
WATER LEVEL: 1.5 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



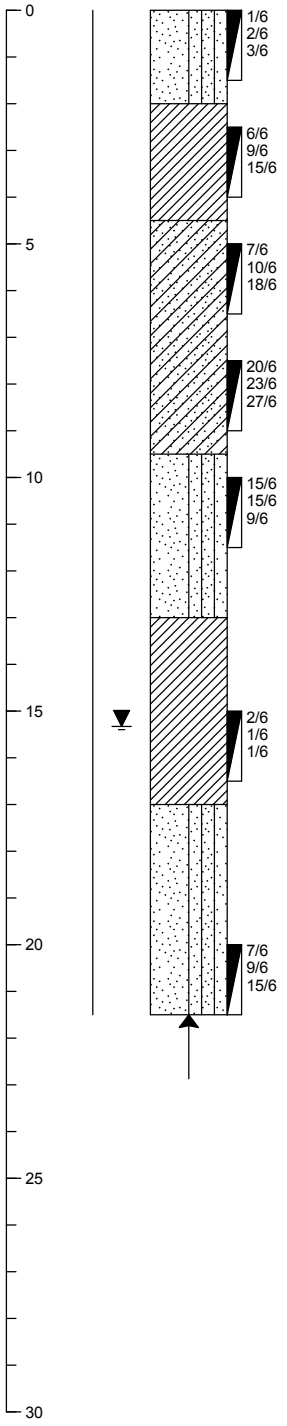
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
		SP-SM	Loose to Medium Brown and Tan Fine SAND with Some Silt	7 10 9
		SP-SM	Medium Tan Fine SAND with Some Silt	14 19 13 18
		SP-SM	Medium Gray Fine SAND with Some Silt	21

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-15
PROJECT: RIVERINE TRAINING FACILITY **PROJECT NO.:** 06-462
PROJECT LOCATION: HANCOCK COUNTY, MS **METHOD:** HOLLOW STEM AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GRADE
DATE DRILLED: 12/22/06 **DATE COMPLETED:** 12/22/06
WATER LEVEL: 15.4 ft **WATER LEVEL DATE:** 12/22/06
GEOL / ENGR: G. FORSYTHE **DRILLER:** M. CONNIFF



Elevation / Depth	USCS	Description	SPT N	NM %	LL %	200 %
	SP-SM	Loose Brown & Yellow Fine SAND with Some Silt	5			
	CL	Very Stiff Orange CLAY with Some Sand	24	17.2	32	51
	SC	Medium to Very Dense Orange Clayey Fine SAND	28	15.4	27	48
			50			
	SP-SM	Medium to Dense Gray & Yellow Fine SAND with Some Silt	24			
	CL	Very Soft Brown & Gray CLAY with Trace Organics	2			
	SP-SM	Medium Brown Fine SAND with Some Silt	24			

Remarks:

GEOLOG3 F:\JOBFOL~1\2006\06462~1\06242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

APPENDIX C

LABORATORY TEST DATA

Materials Testing Report	SOUTHERN EARTH SCIENCES, inc.	Tabulated Data Sheet
Client:	URS Corp	Date: 01/05/07
Project:	Combat Watercraft Facility - Stennis Space Center	SESI Project No. 06-462

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
RB-1	S-4	7.5-9.0	CL	18.2			65.8
RB-1	S-6	15.0-16.5	SC	22.8			42.9
RB-2	S-2	2.5-4.0	CL	17.2			72.9
RB-3	S-2	2.5-4.0	SC	15.9			46.3
RB-3	S-9	30.0-31.5	SP-SM	20.8			7.6
RB-4	S-3	5.0-6.5	SC	14.2			31.2
RB-5	S-5	10.0-11.5	CL	26.8			70.9
RB-7	S-2	2.5-4.0	CL	19.8	29	16	95.4
RB-7	S-8	25.0-26.5	SP-SM	19.0			5.5
RB-8	S-2	2.5-4.0	CL	56.8	20	8	97.0
RB-8	S-3	5.0-6.5	CL-ML	15.5	19	7	56.9
RB-9	S-2	2.5-4.0	CL	19.8	35	22	97.6
RB-10	S-3	5.0-6.5	CL	14.5			71.2
RB-12	S-2	2.5-4.0	CL	16.2	24	10	68.1
RB-13	S-5	10.0-11.5	SC-SM	28.2	22	7	42.1
RB-15	S-2	2.5-4.0	CL	17.2	32	15	50.7
RB-15	S-3	5.0-6.5	SC	15.4	27	14	48.0

Reviewed:

COMPACTION TEST REPORT

Project No.: 06-462 **Date:** 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-2

Elev./Depth: **Sample No.** 12-19-06

Remarks: CBR VALUE 32.2 (at 91.2% of PD)

MATERIAL DESCRIPTION

Description: GRAY CLAYEY SAND

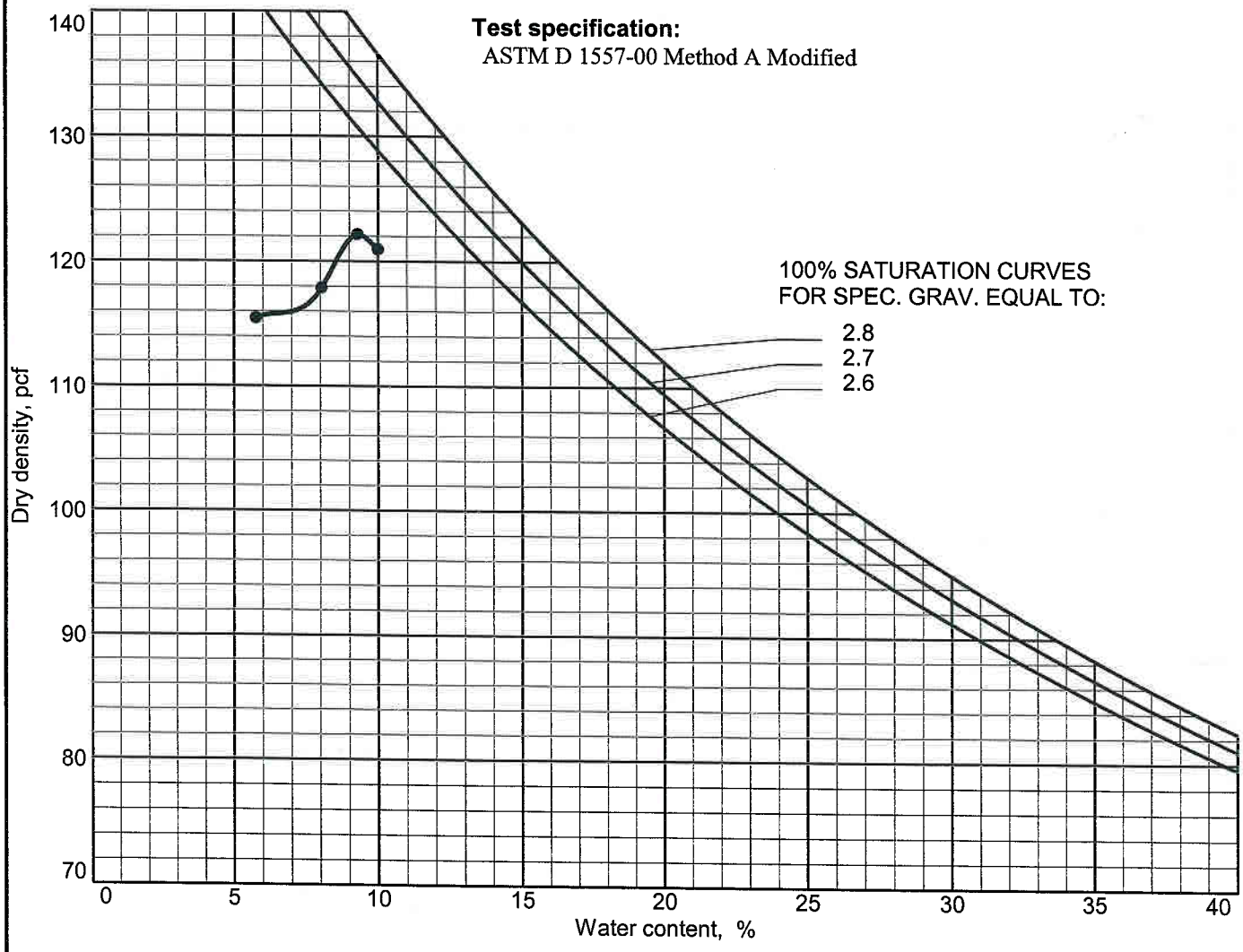
Classifications - **USCS:** SC **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% > No.4 = % **% < No.200 =** 45.7 %

TEST RESULTS
Maximum dry density = 122.2 pcf
Optimum moisture = 9.3 %



Figure

SOUTHERN EARTH SCIENCES

COMPACTION TEST REPORT

Project No.: 06-462 **Date:** 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-3

Elev./Depth: **Sample No.** 12-19-06

Remarks: CBR VALUE 1.1 (at 89.4% of PD)

MATERIAL DESCRIPTION

Description: BROWN/GRAY CLAYEY SAND

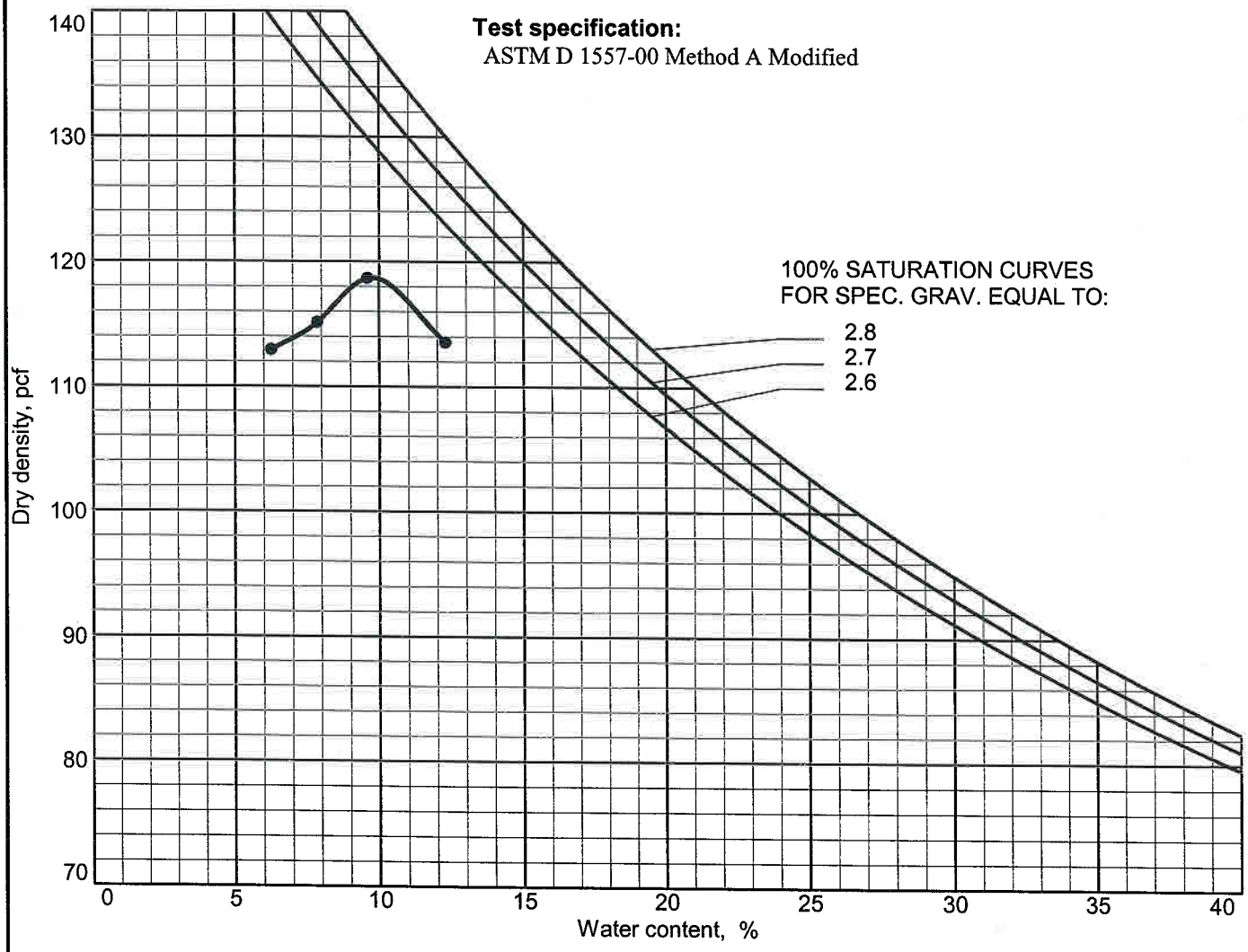
Classifications - **USCS:** SC **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% > No.4 = % **% < No.200 =** 39.7 %

TEST RESULTS
Maximum dry density = 118.7 pcf
Optimum moisture = 9.7 %



Figure

SOUTHERN EARTH SCIENCES

COMPACTION TEST REPORT

Project No.: 06-462 **Date:** 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-15

Elev./Depth: **Sample No.** 12-19-06

Remarks: CBR VALUE 40.5 (at 93.1% of PD)

MATERIAL DESCRIPTION

Description: GRAY CLAY

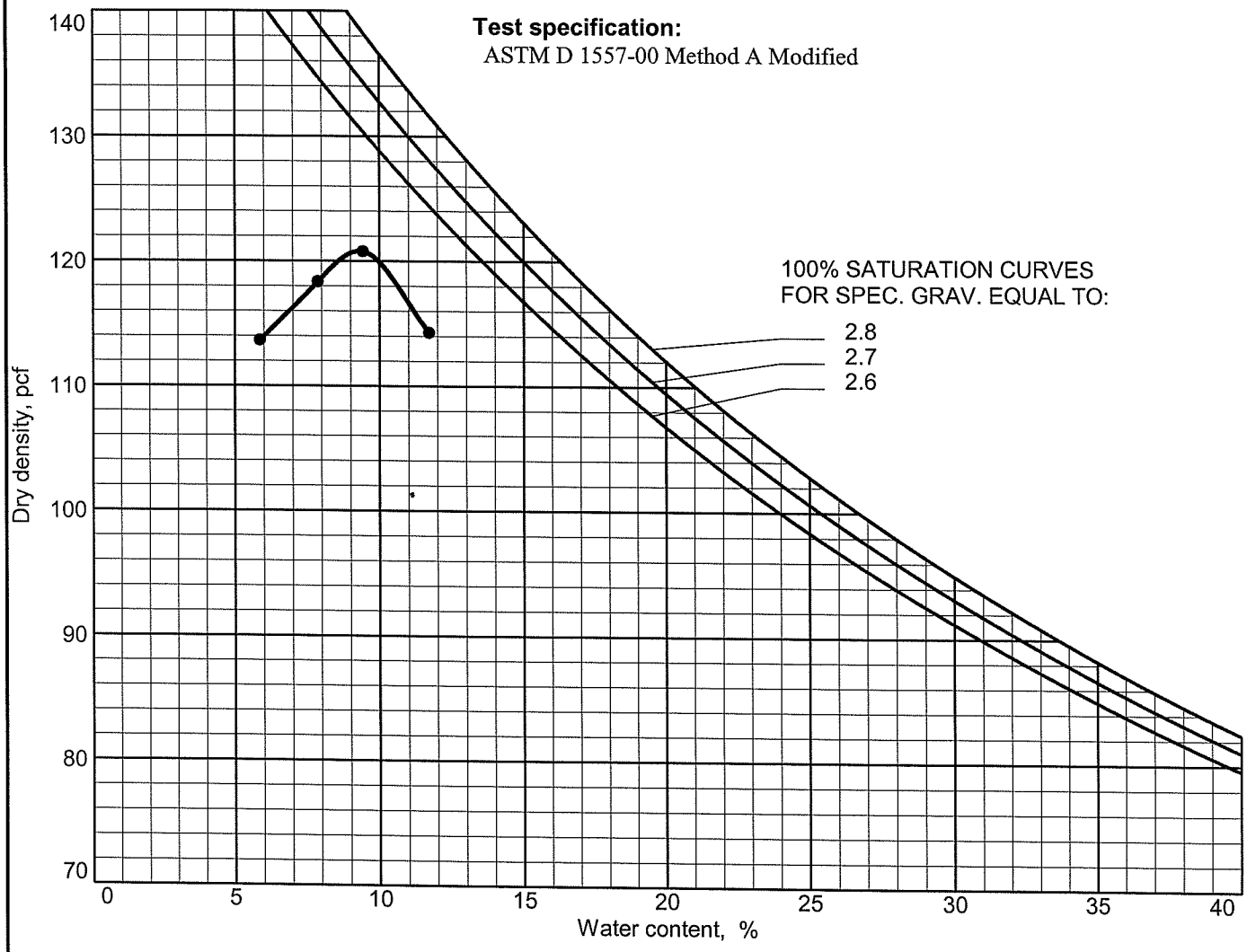
Classifications - **USCS:** CL **AASHTO:**

Nat. Moist. = **Sp.G. =**

Liquid Limit = **Plasticity Index =**

% > No.4 = % **% < No.200 =** 67.3 %

TEST RESULTS
Maximum dry density = 120.8 pcf
Optimum moisture = 9.3 %



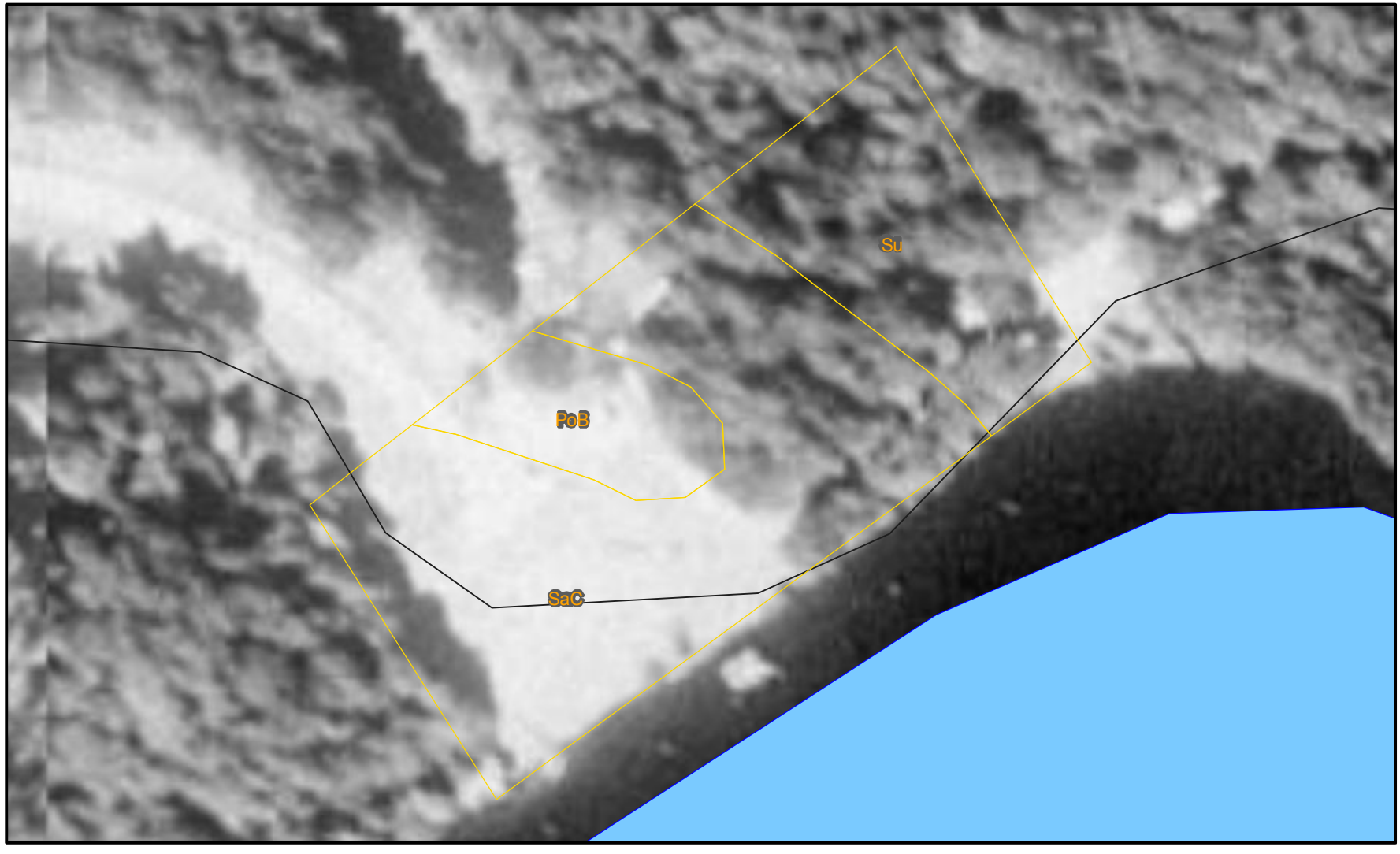
Figure

SOUTHERN EARTH SCIENCES

APPENDIX D

NRCS SOIL DATA

Bulkhead and Helo Pad



Meters
0 10 20 40

Feet
0 35 70 140 210 280

Bulkhead and Helo Pad

MAP LEGEND

- Soil Map Units
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gulley
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gulley
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 16

Soil Survey Area: Hancock County, Mississippi
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:20000

Map comprised of aerial images photographed on these dates:
10/25/1989

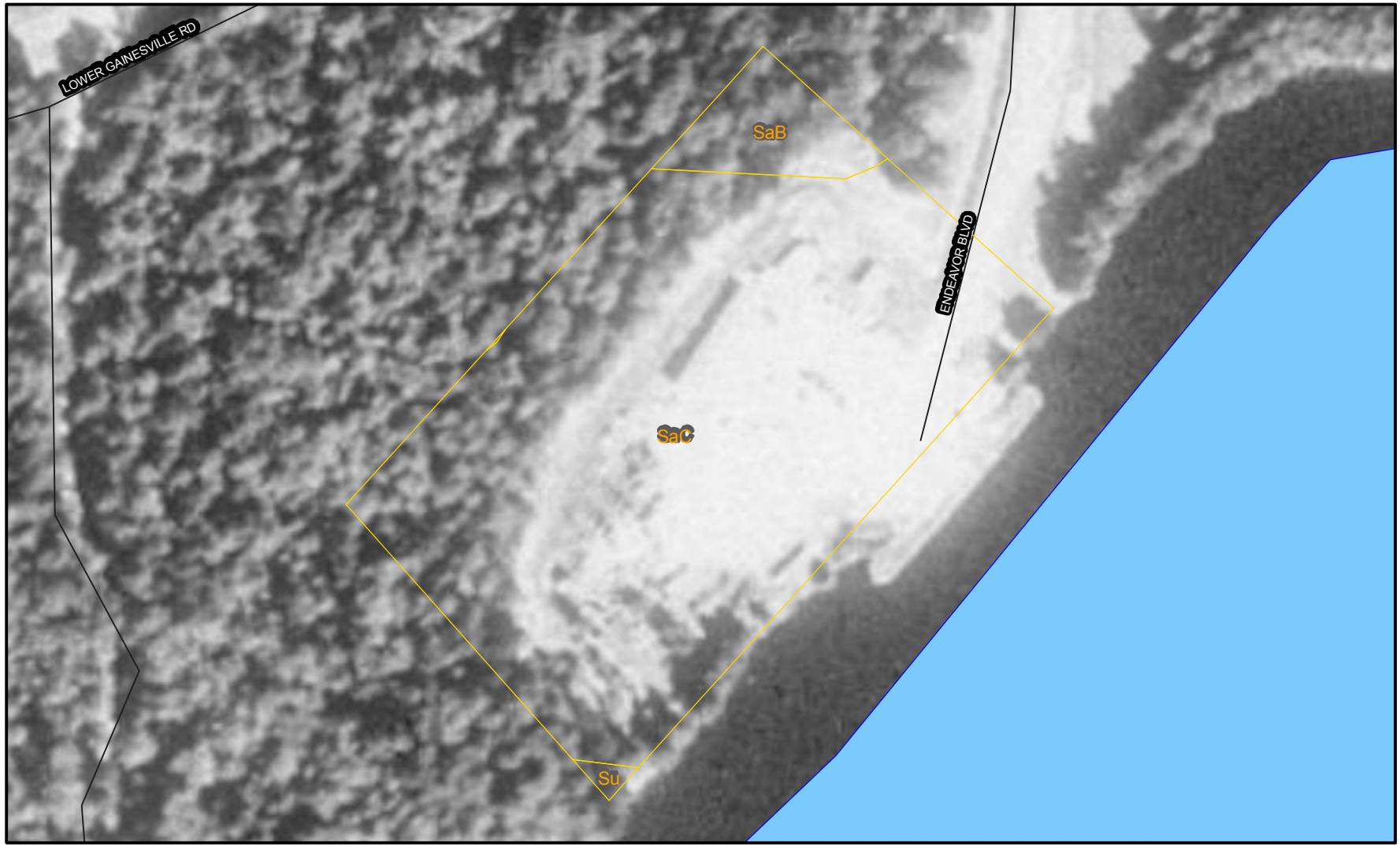
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend Summary

Hancock County, Mississippi

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PoB	Poarch fine sandy loam, 2 to 5 percent slopes	0.3	11.5
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	1.9	63.5
Su	Smithton fine sandy loam, frequently flooded	0.8	25.0

Riverine Training Facility



Meters
0 15 30 60

Feet
0 50 100 200 300 400

Riverine Training Facility

MAP LEGEND

- Soil Map Units
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gulley
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gulley
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 16

Soil Survey Area: Hancock County, Mississippi
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:20000

Map comprised of aerial images photographed on these dates:
10/25/1989

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend Summary

Hancock County, Mississippi

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SaB	Saucier fine sandy loam, 2 to 5 percent slopes	0.4	6.4
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	5.8	93.1
Su	Smithton fine sandy loam, frequently flooded	0.0	0.5

ATTACHMENT 4

GEOTECHNICAL REPORTS

March 26, 2008 Southern Earth Sciences Report

Mobile, AL

762 Downtowner Loop West
P.O. Box 160745
Mobile, AL 36616

Tel.: (251) 344-7711
Fax: (251) 341-9488
www.soearth.com

SOUTHERN EARTH SCIENCES, inc.
Geotechnical &
Environmental
Consultants

March 26, 2008

URS GROUP, INC.
7650 West Courtney Campbell Causeway
Tampa, FL 33607

ATTENTION: Mr. Fred Walker, P.E.

REFERENCE: Proposed Riverine Training Facility – Preferred Site
Project No. P-210
Stennis Space Center
Hancock County, Mississippi
SESI Project M08-028

Dear Mr. Walker:

Southern Earth Sciences, Inc., has completed the subsurface exploration and engineering studies and analyses for the above referenced project. Authorization to proceed was given us by Ms. Kathy Hartman. The following report provides a discussion of the development, exploration procedures used, subsurface conditions encountered, considerations for site preparation, and foundation recommendations.

SITE DESCRIPTION

The area is bound by Lower Gainesville Road to the north, a wooded area to the south, a utility storage area to the east and an unpaved access road to the west. At the time of our investigation we noted the site was heavily wooded with moderate underbrush. The topography varied approximately from Elevation 7.0 to Elevation 22.0, based on a provided topographic drawing. A geographic map of the area is attached in Appendix A.

GEOLOGIC SETTING

The site is located in the southern, lower, Gulf Coastal Plain physiographic province of Mississippi. Soils encountered and sedimentary deposits are primarily from the Holocene period, and consist of loam, sands, gravels and clay of the Coastal Deposits formation. A geologic map of the area is included in Appendix A.

PROJECT INFORMATION

It is our understanding that the project will consist of several one- to two-story buildings of steel and masonry construction with concrete floor slabs on grade. We also understand that the finished floors of the structures are planned at approximately Elevation 20.0, which may require as much as 9 feet of fill in some areas. In addition, paved parking areas will be constructed adjacent to the proposed structures. For the purpose of this report, we have assumed design column loads of 100 kips and maximum wall loads of 8 kips per lineal foot, as no structural loads were provided.

FIELD INVESTIGATIVE PROCEDURES

On March 13 through 18, 2008, we performed seventeen (17) split-spoon sample soil borings with Standard Penetration Tests in locations as determined by our engineers and to depths as directed. The boring locations were staked in the field by our firm using a portable, hand-held, global-positioning receiver. The approximate locations of the borings are shown on a Test Location Plan included in Appendix A.

Boring RB-4, performed to a depth of 41½ for a previous exploration for this project, was in close vicinity of the Operations Building and its information was used for this project. A copy of the boring log is also attached in Appendix A.

The soil borings with Standard Penetration Tests (SPT) were advanced to depths of 16½ to 61½ feet using track-mounted, mud-rotary type drilling equipment. All samples obtained in the field were returned to our laboratory for visual classification in accordance with the Unified Soil Classification System and further testing. Logs for the soil borings are attached to this report in Appendix B.

LABORATORY TESTING

In order to define the soil properties more closely, classification tests were performed on selected samples obtained in the borings. Results of these tests are shown on the individual boring logs and a summary is attached in Appendix C.

SUBSURFACE CONDITIONS ENCOUNTERED

Subsurface conditions for each area will be discussed separately. All references to depth are made with respect to the existing ground surface at the time the fieldwork was performed.

Operations and Boat Maintenance Buildings

Subsurface conditions encountered in these borings varied and they will be addressed separately. All references to depth are made with respect to the existing ground surface at the times the borings were performed.

Boring No. B-1 showed very soft to soft clay to 4 feet, followed by loose sand to 7 feet, medium clay to 14 feet, loose to medium clayey sand to 23 feet, dense to very dense sand 38 feet, and loose sand to 43 feet. This was underlain by soft to medium clay to 55 feet, very dense sand to 58 feet, and soft clay to the depth of the boring at 61½ feet.

Boring No. B-2 exhibited very loose to medium sand to 4 feet, medium clay to 7 feet, medium sand to 33 feet and medium clay to the depth of the boring at 41½ feet.

Boring No. B-16 displayed soft to medium clay to 7 feet, followed by dense sand to 9½ feet, and loose to medium sand to the depth of the boring at 16½ feet.

Boring No. RB-4 revealed loose to medium sand and clayey sand to 7 feet, underlain by medium clay to 13 feet, medium to dense sand to 38 feet, and soft clay to the depth of the boring at 41½ feet.

10-Boat Storage

Boring Nos. B-3 and B-4 revealed loose to medium sand and medium to stiff clay to 4½ feet, underlain by medium sand and clay to the depth of the borings at 26½ feet.

6-Boat Storage

Boring No. B-5 showed loose to medium sand to 9½ feet, medium to very stiff clay to 13 feet, and medium to dense sand to the depth of the boring at 26½ feet.

Parking Areas

The remainder of the borings showed layers of sand and clayey sands with densities ranging from very loose to dense, alternating with strata of medium to hard consistency clays and silts. The only notable exceptions occurred in the following areas:

- Boring No. B-10, which showed a stratum of soft clay between depths of 7 to 10½ feet
- Boring No. B-15, which exhibited a layer of soft clay from 2 feet to 5½ feet

Ground Water Table

The ground water table varied from a depth of 0.9 feet in Boring No. B-13 to 11.0 feet below grade in Boring No. B-5. The most likely reasons for the variance are due to differences in elevation of the borings as well as ground water being trapped over a relatively impermeable layer, often referred to as a "perched" water table. It must be noted that fluctuations in the level of the ground water table may occur due to changes in rainfall, drainage, temperature and other factors not evident at the time measurements were made. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on such assumptions of variation.

USDA NRCS SOILS CLASSIFICATION

Based on information obtained from the Natural Resource Conservation Service of the United States Department of Agriculture, the predominant soil classes at these sites are the Saucier fine sandy loam (SaB, SaC), Saucier-Susquehanna complex (ScD), and Smithton fine sandy loam Su). Summaries of the soil surveys for these sites are included in Appendix D.

EXPANSIVE SOIL CHARACTERISTICS

With regards to Section 1802.3.2 of the 2003 Edition of the International Building Code (IBC), laboratory tests performed on clayey soils encountered at relatively shallow depths (less than 7½ feet in depth) do not exhibit the characteristics of expansive soils.

SEISMIC CONSIDERATIONS

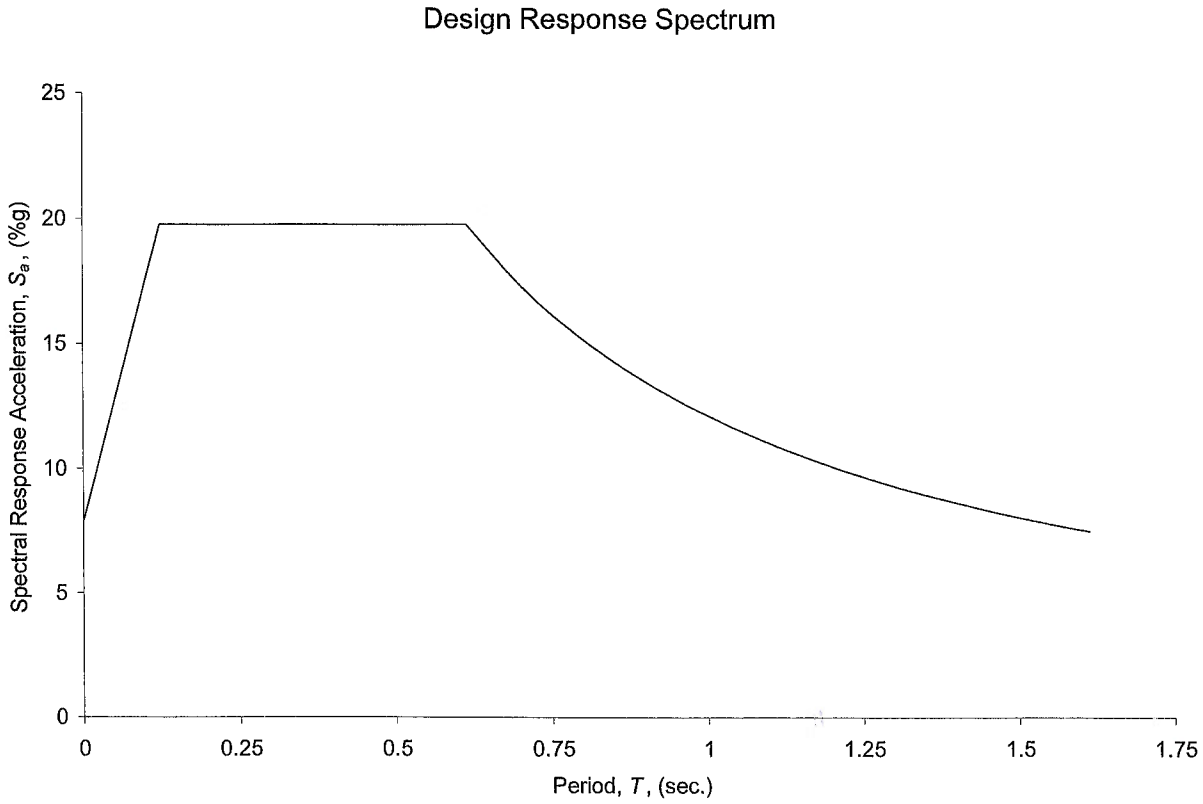
Based on the subsurface conditions encountered, with reference to Table 1615.1.1 of the IBC, these sites would best be categorized as **Site Class "E"**. It is noted, borings for this project were performed to a maximum depth of 61½ feet and the IBC normally requires soil information to a depth of 100 feet be used in site classification. In Section 1615.1.1, however, it states that appropriate soil properties can be estimated by a registered design professional if site-specific data is not available. Data available in our files from previous projects near this site was used for this purpose.

In accordance with Sections 1615.1.2, 1615.1.3, and 1615.1.4 of the IBC, design parameters were calculated for an earthquake having a 2% probability of exceedence in a 50-year period using seismic data available from the United States Geological Survey (USGS). The results of these calculations, expressed as a percent of the gravitational force (g) are as follows:

Five-Percent Damped Design Spectral Response Acceleration Parameters

Short Periods (0.2 sec)	S_{DS} = 19.77 %g
1-Second Periods	S_{D1} = 12.11 %g

Based on the IBC Site Class and the above seismic data, a typical spectral response curve for this site was developed and is shown below:



ENGINEERING ANALYSIS

A study of the subsurface conditions in the area of the planned structures shows that in most cases, soils of reasonable density and consistency exist to a depth of at least 35 feet. As previously mentioned, however, soft clays were discovered in Boring Nos. B-1, B-10, B-15 and B-16 at relatively shallow depths. Based on theses conditions and the assumed design data, these structures could be supported on shallow foundations; however, remedial action will be required to mitigate the layers of potentially compressible clays found at shallow depths.

SUBGRADE PREPARATION

Because of the moderately low permeability of some of the shallow soils at this site, water will tend to collect in low areas. These materials, when wetted, will retain moisture for long periods, and these soils can undergo significant weakening if disturbed in the presence of excess moisture. For these reasons, design and implementation of a permanent grading and drainage plan is essential. In the initial stages of site development, effective drainage must be established and modified as necessary during construction. In areas where it will be necessary to undercut

weaker soils, control of water and drainage is vital. Further, construction traffic, especially rubber-tired vehicles, should be minimized when the soils are wet.

Initially, the site should be cleared, grubbed, and stripped of all soils containing roots and organic matter. Topsoil and other organic laden soils obtained during site stripping operations could be stockpiled on site for reuse in landscaped areas and on the sides of roads.

Remedial Action

Operations and Boat Maintenance Buildings

In the footprint of these structures, we would recommend that the subgrade be undercut to a depth of at least four feet below original grade in order to remove the layers of soft clays and very loose clayey sands.

Other Areas

In the area of lower elevation to the south of the site, we would recommend that the potentially weak layers, as noted in Boring Nos. B-3, B-15, and B-17, be undercut to at least Elevation 4.0.

An approximation of the area requiring undercut is shown on the attached Test Location Plan; however the actual depth and lateral extent of these objectionable soils can only be accurately determined by careful field inspection at the time earthwork operations are performed. If desired, additional shallow borings could be performed to further isolate the areas requiring undercutting. If you would like to discuss this in more detail, please contact us.

The remaining surface soils should be proof rolled with a loaded, tandem-axle, dump truck in the presence of a geotechnical engineer or his representative to expose any soft or yielding areas. Where encountered, these soils should be excavated and replaced with thoroughly compacted backfill. The remaining surface soils should then be thoroughly and uniformly compacted in place. Thoroughly compacted backfill and fill should then be placed to the desired subgrade elevations.

Backfill and Fill

Backfill and Fill material should be non-plastic and granular in nature with a maximum of 20% passing the Wash 200 Sieve. It should be placed in thin successive layers 8" to 10" loose measurement and each layer should be compacted to at least 95% of its maximum laboratory dry density, within ±2% of its optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). In-place field density tests should be performed as this material is being placed and compacted in order to insure that required density is being achieved. Since these testing services are within the scope of our activities, we urge that our firm be retained to assist you during the earthwork phase of this project.

RECOMMENDATIONS

Footings

We would recommend that footings be designed for a maximum net allowable unit soil pressure of 2,000 pounds per square foot in order to minimize post-construction settlement. Bearing depths should be a minimum of 18 inches below finished grade with a minimum width of 18 inches. Based on the assumed design data and this maximum soil pressure, total settlement of the foundations would not be expected to exceed 1 inch, approximately 50% of which could be differential between interior columns and load bearing walls.

Concrete Floor Slabs

After the subgrade has been prepared as outlined, conventionally designed concrete slabs could be placed on grade. These slabs should be appropriately jointed such that minor differential movement does not cause excessive distortion or damage. For design purposes, a modulus of subgrade reaction (*k*) of 200 pounds per cubic inch (pci) could be used.

PAVEMENT DESIGN DATA

A bulk samples was obtained for California Bearing Ratio (CBR) testing. In a sample obtained in the vicinity of Boring No. B-7, a CBR value of 8 was determined. For subgrade soils composed of fill materials placed and compacted as outlined above, a CBR value of 10 would apply.

Is must be noted; as discussed above, a layer of soft clay was encountered in Boring No. B-10 at a depth of 7 feet. Calculations indicate that if four feet of fill material are placed to achieve the final subgrade elevation, long-term settlements of ½ to ¾ inches could occur. If this amount of settlement is unacceptable, design changes or remedial action will be necessary to mitigate this condition.

GENERAL COMMENTS

The soil samples obtained during the subsurface investigation will be retained the end of 2008. If no further instructions are received, they will be disposed of at that time.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based on the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated boring location and on the particular date drilled.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering works and judgments rendered meet the standard of care of our profession.

This report has been prepared in order to aid in the evaluation of this project and to assist the architects and engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

As the project geotechnical engineer of record that developed the foundation design recommendations, please be aware that we cannot accept responsibility for the performance of the foundation system if we are not afforded the opportunity to confirm that our recommendations have been followed. Accordingly, we recommend that Southern Earth Sciences, Inc. be retained on this project to perform observation and field-testing services during the construction phase of the foundation system.

This report is exclusively for the use and benefit of the addressee(s) identified on the first page of this report and is not for the use or benefit of, nor may it be relied upon by any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the addressee(s) hereof without, in each case, the advance written consent of the undersigned.

We appreciate the opportunity to serve you on this project. If you have any questions or if we may be of further assistance, please call at your convenience.

Very truly yours,

SOUTHERN EARTH SCIENCES, INC.

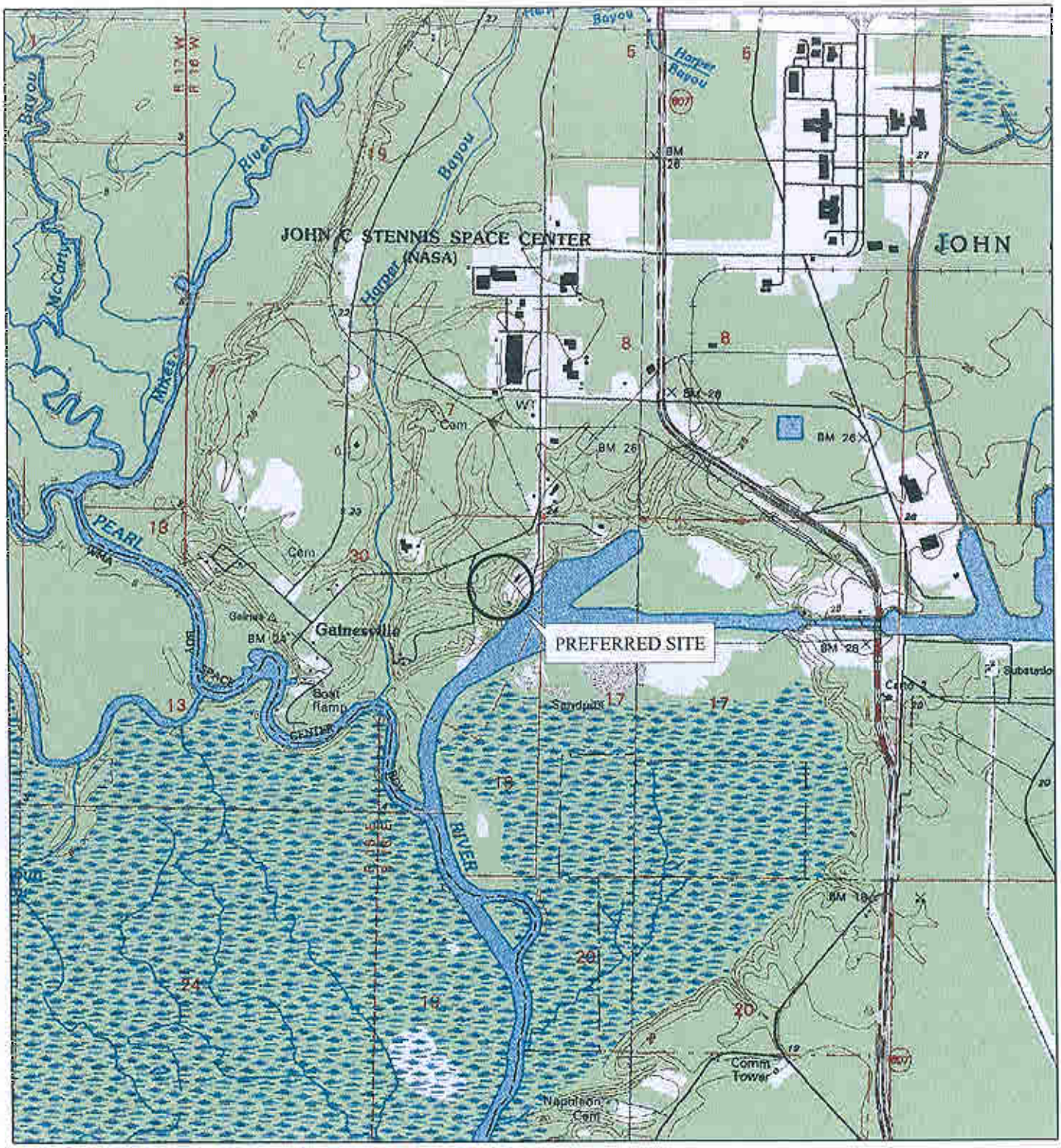
R. Graham Forsythe, P.E.
Registered, Mississippi 16515

Lewis Copeland, Jr., P.E.
Registered, Mississippi 13312

RGF/LCJR/gf
Enclosures

APPENDIX A

TEST LOCATION PLAN

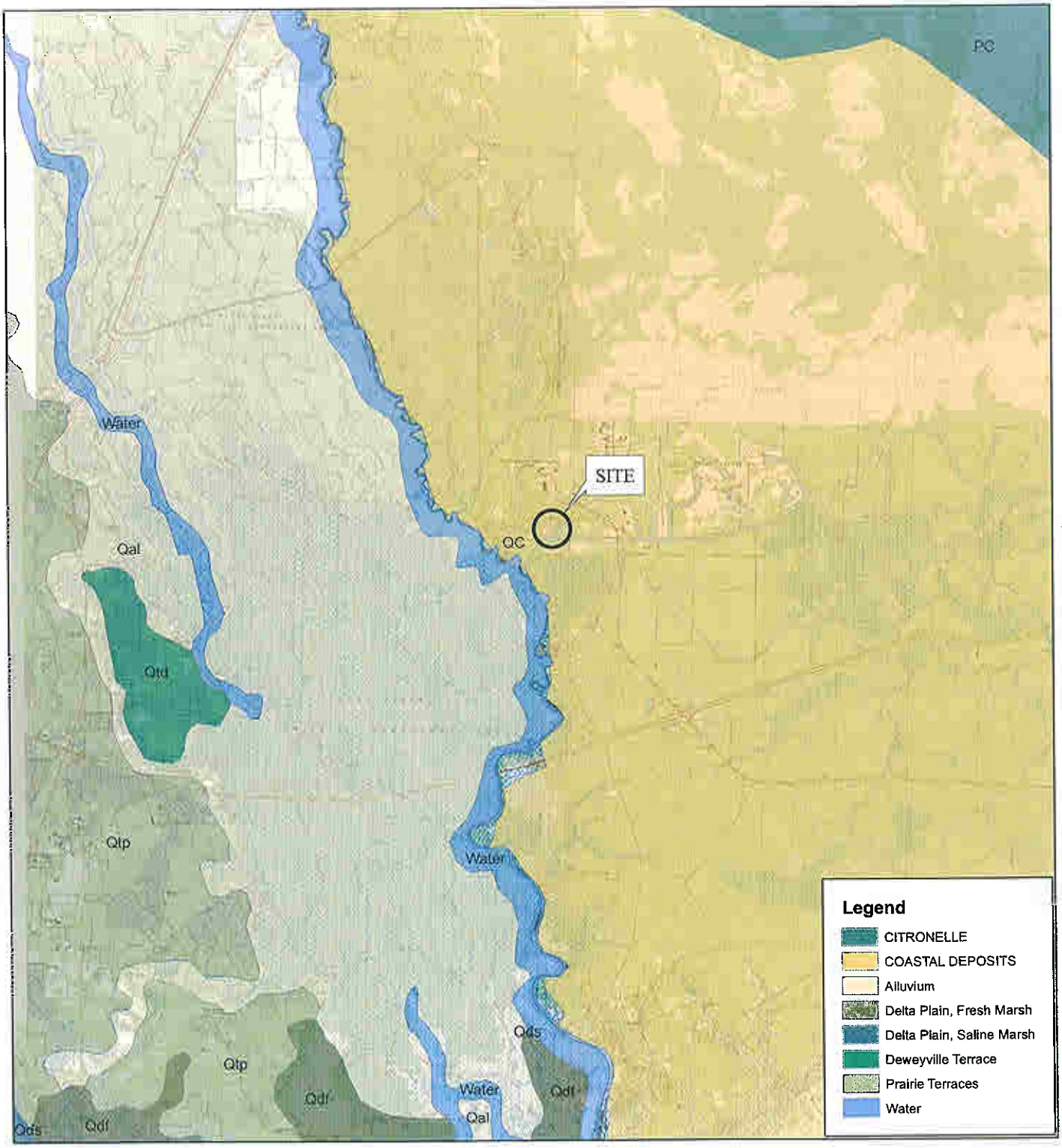


1:24,000

0 1,000 2,000 4,000 6,000 8,000 Feet

EXTRACTED FROM THE USGS PHOTOMOSAIC OF HANCOCK COUNTY

RIVERINE TRAINING FACILITY **PREFERRED SITE** **HANCOCK COUNTY, MISSISSIPPI**	**SOUTHERN EARTH SCIENCES, inc.** AN EMPLOYEE OWNED COMPANY	**TOPOGRAPHIC MAP** **SITE LOCATION** **SESI JOB NO.: 08-028**



N

W E

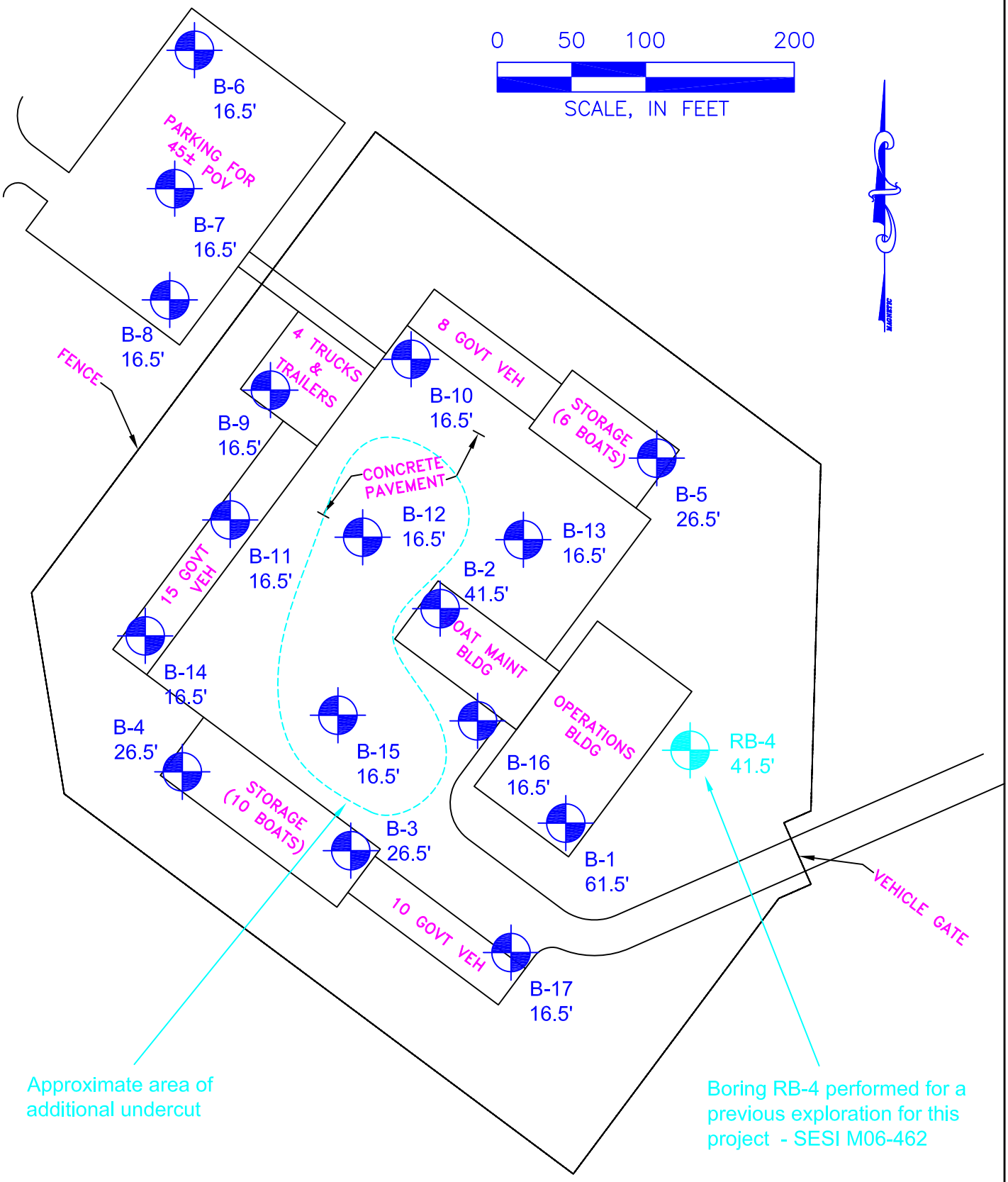
S

1:120,000

0 5,000 10,000 20,000 30,000 40,000 Feet

EXTRACTED FROM THE USGS PHOTOMOSAIC OF HANCOCK COUNTY
GEOLOGIC MAPS OF LA AND MS FROM THE USGS

RIVERINE TRAINING FACILITY **PREFERRED SITE** **HANCOCK COUNTY, MISSISSIPPI**	**SOUTHERN EARTH SCIENCES, inc.** AN EMPLOYEE OWNED COMPANY	**GEOLOGIC MAP** **SITE LOCATION** **SESI JOB NO.: 08-028**



PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT M08–028

SOUTHERN EARTH SCIENCES, inc.

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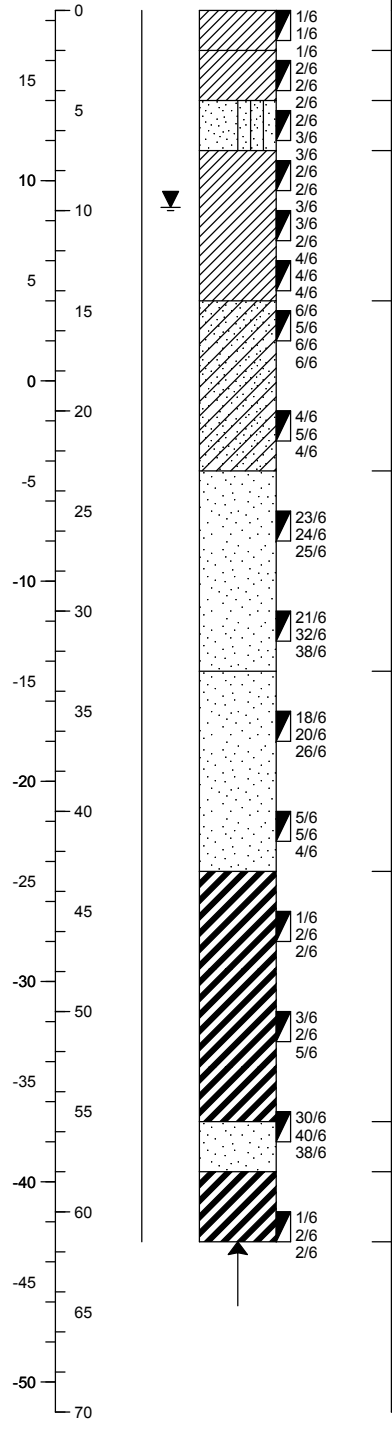
FIGURE 1
TEST LOCATION PLAN

APPENDIX B

BORING LOGS

LOG OF BOREHOLE NO. B-1

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER/WASH
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 18.5 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 10 ft
WATER LEVEL DATE: 03/14/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



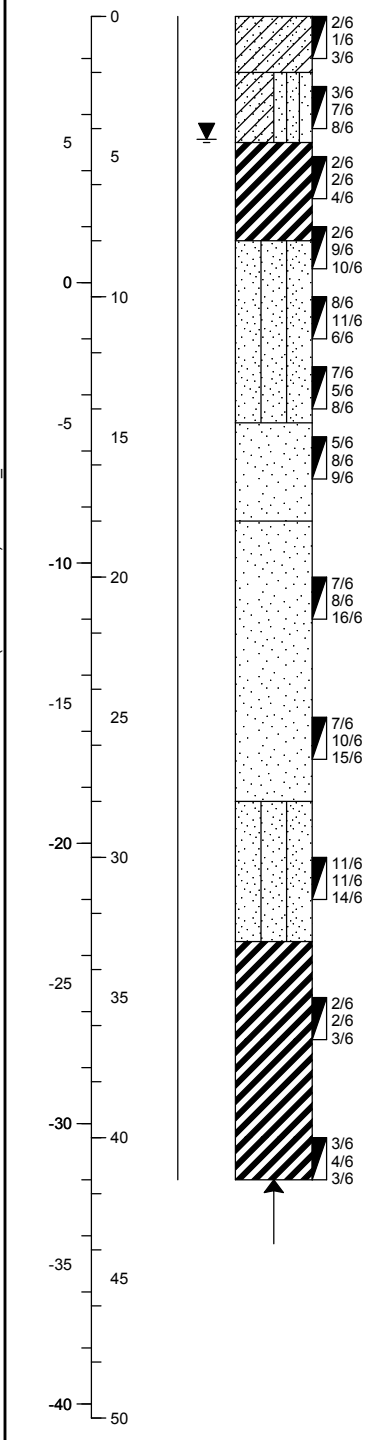
Elevation / Depth	USCS	Description	SPT N	NM %	LL %	200 %
18.5	CL	Very Soft Dark Brown Sandy CLAY with Organics	2	32.0		76
15	CL	Soft Orange and Gray Sandy CLAY	4	30.8	20	82
5	SP-SM	Loose Tan Fine SAND with Silt	6	22.7		7
10	CL	Medium Gray Sandy CLAY	5	20.7	30	81
10			6			
5			10			
15	SC	Loose to Medium Gray and Orange Clayey Fine SAND	12			
0			9			
20	SP	Very Dense Dark Brown Silty Fine SAND and Organics	49	26.1		4
-5			70			
25	SP	Loose to Dense Gray Fine SAND	46			
-10			9			
30	CH	Soft to Medium Gray CLAY with Trace Sand	4			
-15			7			
35						
-20						
40						
-25						
45						
-30						
50						
-35						
55	SP	Very Dense Gray Fine SAND	78			
-40	CH	Soft Gray CLAY with Trace Sand	4			
60						
-45						
65						
-50						
70						

Remarks:

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO_EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-2

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER/WASH
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 9.5 ft
DATE DRILLED: 03/16/08
DATE COMPLETED: 03/16/08
WATER LEVEL: 4.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



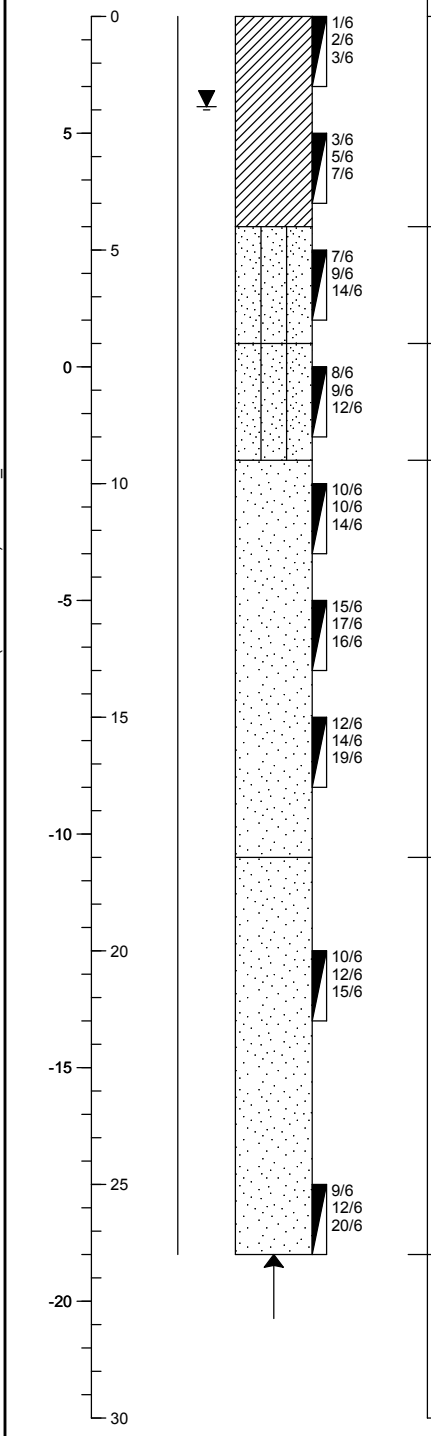
USCS	Description	SPT N	NM %	LL %	200 %
SC	Very Loose Dark Brown and Tan Clayey Fine SAND	4	22.4		44
SC-SM	Medium Brown and Orange Clayey SAND	15	19.3	20	42
CH	Medium to Very Stiff Gray CLAY with Trace Sand	6	23.0	51	70
SM	Medium Tan and Orange SIlty Fine SAND	19			
		17			
		13			
SP	Medium Dark Brown Fine SAND with Organics	17			
SP	Medium Gray and Orange Fine SAND	24			
		25	26.6		4
SM	Medium Gray Silty Fine SAND	25			
CH	Medium Gray CLAY with Trace Sand	5			
		7			

Remarks:

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO_EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-3

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER/WASH
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 7.5 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 2 ft
WATER LEVEL DATE: 01/24/00
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



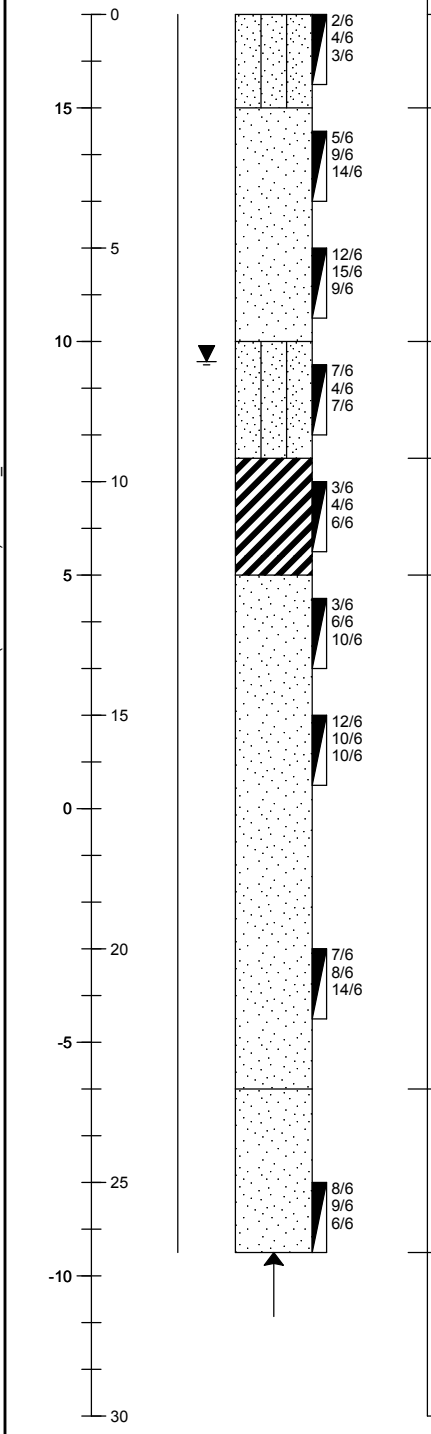
USCS	Description	SPT N	NM %	200 %
CL	Medium to Stiff Orange Sandy CLAY	5		
		12	26.0	74
SM	Medium Orange and Gray Silty Fine SAND	23	13.9	76
SM	Medium Tan Silty Fine SAND with Wood	21		
SP	Medium to Dense White Fine SAND	24		
		33		
		33		
SP	Medium Dark Brown Fine SAND	27		
		32		

Remarks:

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO_EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-4

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER/WASH
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 17 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 7.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



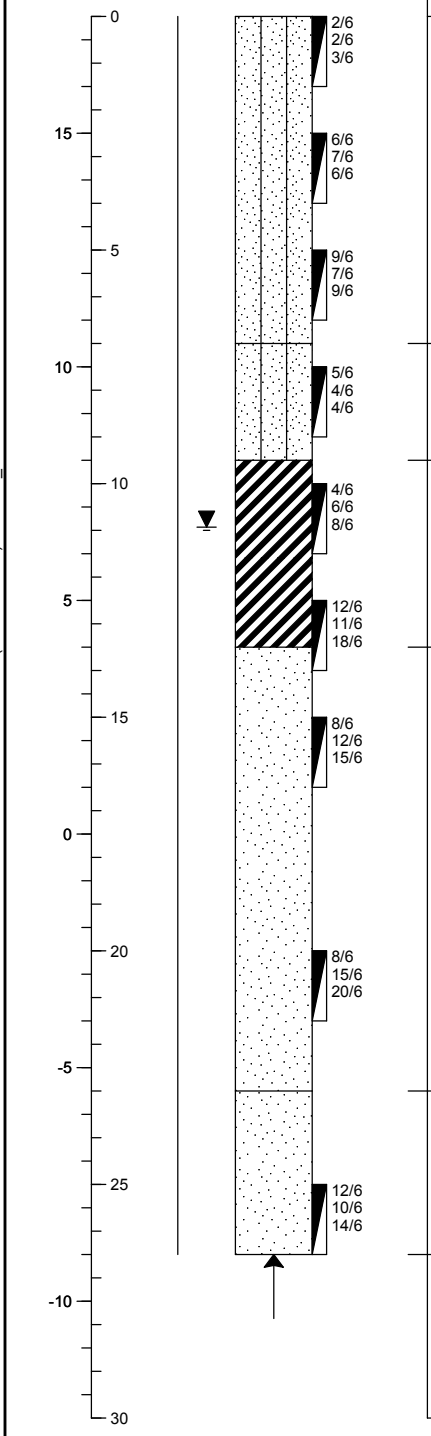
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SM	Loose Tan and Orange Silty Fine SAND	7			
		SP	Medium Orange and Brown Fine SAND	23			
				24			
		SM	Medium Gray Silty Fine SAND	11			
		CH	Medium Brown CLAY with Trace Sand	10	53.6	80	98
		SP	Medium White to Gray Fine SAND	16	18.3		2
				20			
				22	17.0		5
		SP	Medium Dark Brown Fine Sand	15			

Remarks:

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LOG OF BOREHOLE NO. B-5

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER/WASH
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 17.5 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 11 ft
WATER LEVEL DATE: 03/14/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



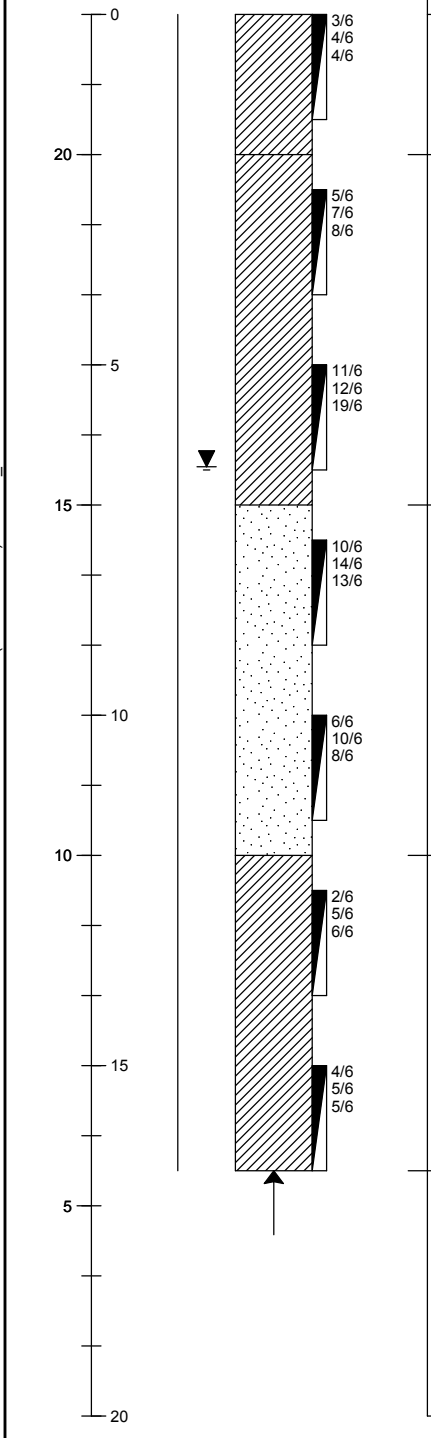
USCS	Description	SPT N	NM %	LL %	200 %
SM	Loose to Medium Orange Silty Fine SAND	5			
		13			
		16	13.9		17
SM	Loose Gray and Orange Silty Fine SAND	8			
CH	Medium to Very Stiff Brown CLAY with Trace Sand	14	32.7	54	93
SP	Medium to Dense White Fine SAND	29			
		27			
		35			
SP	Medium Dark Brown Fine SAND	24			

Remarks:

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LOG OF BOREHOLE NO. B-6

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 22 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 6.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



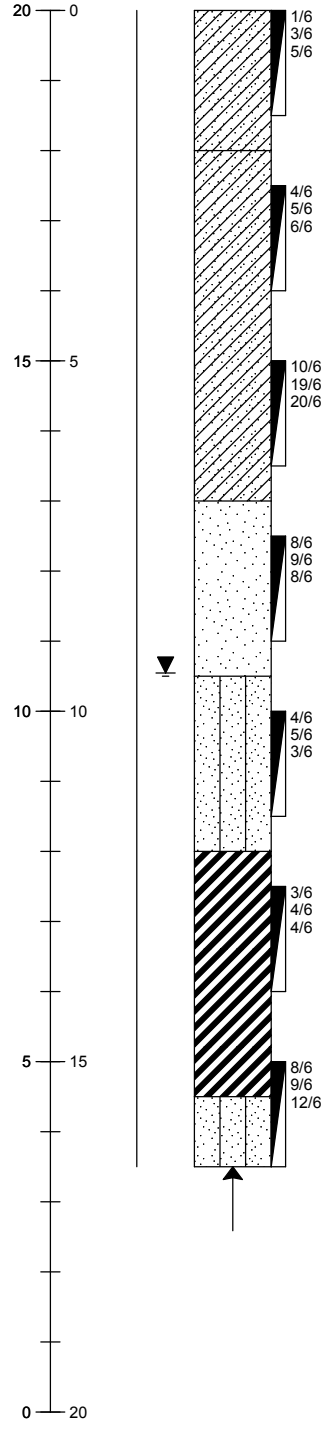
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		CL	Medium Tan Sandy CLAY	8	18.8	73
		CL	Stiff to Very Stiff Orange and Tan Clayey Sandy CLAY	15	19.2	73
				31	22.9	67
		SP	Medium Tan to Gray Fine SAND	27		
				18		
		CL	Medium to Stiff Gray and Brown Sandy CLAY	11		
				10		

Remarks:

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LOG OF BOREHOLE NO. B-7

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 20 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 9.5 ft
WATER LEVEL DATE: 03/17/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



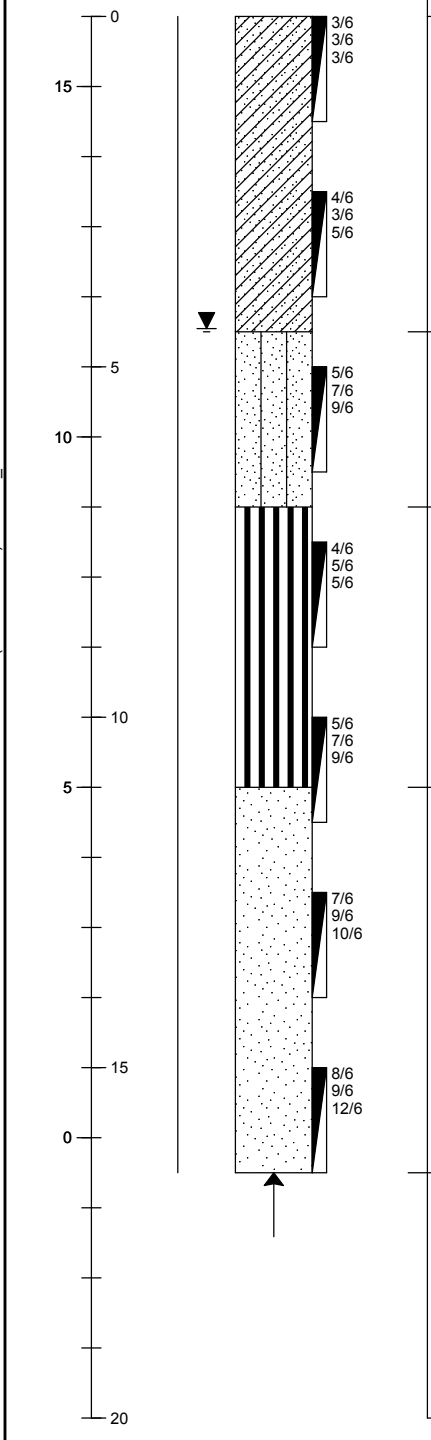
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SC	Loose Brown Clayey Fine SAND with Organics	8			
		SC	Medium to Dense Orange and Brown Clayey Fine SAND	11	20.8		41
				39			
		SP	Medium Tan Fine SAND	17			
		SM	Loose Orange and Tan Silty Fine SAND	8	27.6	21	40
		CH	Medium Brown and tan CLAY with Trace Sand	8	51.2	61	95
		SM	Medium Brown and Orange Silty Fine SAND	21			

Remarks:

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LOG OF BOREHOLE NO. B-8

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 16 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 4.5 ft
WATER LEVEL DATE: 03/17/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



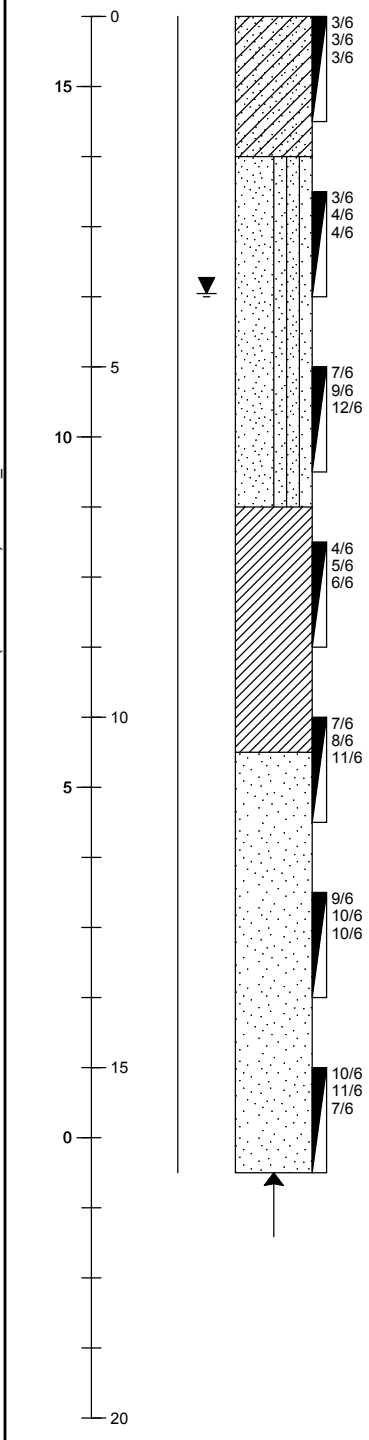
USCS	Description	SPT N	NM %	LL %	200 %
SC	Loose Brown and Tan Clayey Fine SAND	6	14.6		47
		8	18.9		44
SM	Medium Orange Silty Fine SAND	16	22.0	20	23
MH	Medium to Stiff Gray SILT with Trace Sand	10	72.9	58	99
SP	Medium White and Gray Fine SAND	16			
		19			
		21			

Remarks:

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LOG OF BOREHOLE NO. B-9

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 16 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 4 ft
WATER LEVEL DATE: 03/17/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



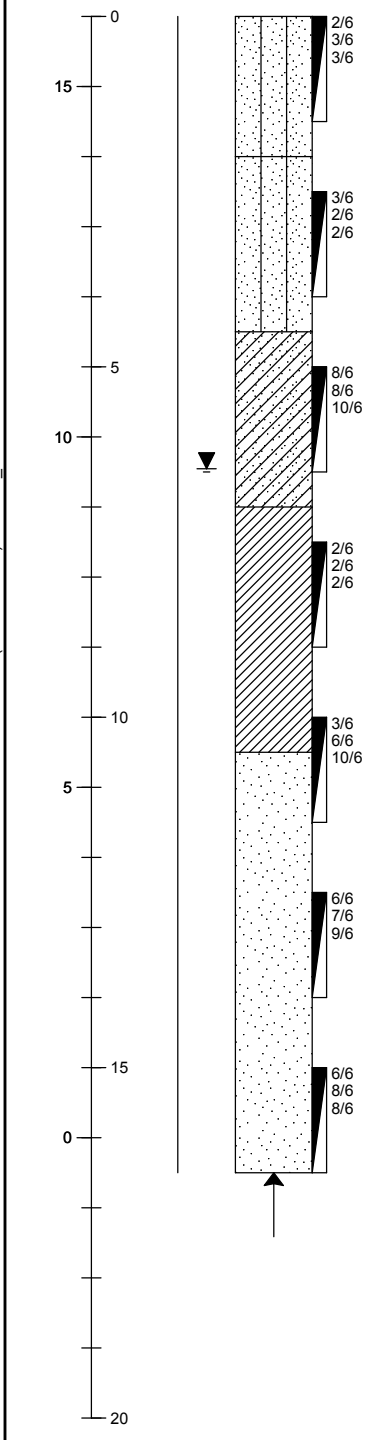
USCS	Description	SPT N	NM %	200 %
SC	Loose Dark Brown and Tan Clayey Fine SAND	6	21.1	49
SP-SM	Loose to Medium Orange and Tan Fine SAND with Silt	8		
		21	20.8	7
CL	Stiff Gray CLAY with Trace SAND	11		
SP	Medium Brown to White and Gray Fine SAND	19		
		20		
		18		

Remarks:

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LOG OF BOREHOLE NO. B-10

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 16 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 6.5 ft
WATER LEVEL DATE: 03/17/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



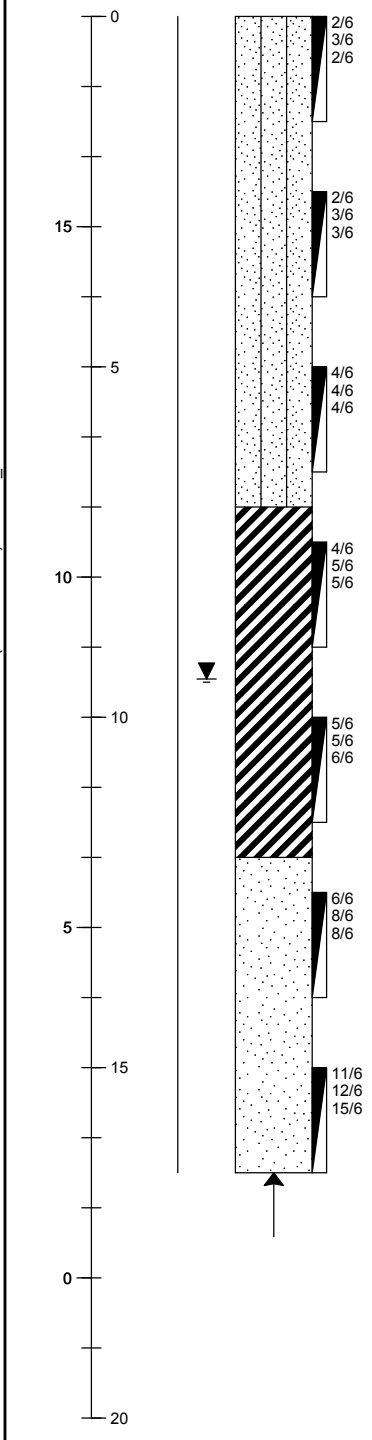
Elevation / Depth	USCS	Description	SPT N	NM %	200 %
	SM	Loose Brown and Tan Silty Fine SAND	6		
	SM	Very Loose Orange Silty Fine SAND	4	17.5	35
	SC	Medium Gray and Orange Clayey Fine SAND	18	20.9	45
	CL	Soft Tan and Orange Sandy CLAY	4		
	SP	Medium Orange To White Fine SAND	16		
			16		
			16		

Remarks:

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LOG OF BOREHOLE NO. B-11

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 18 ft
DATE DRILLED: 03/18/08
DATE COMPLETED: 03/18/08
WATER LEVEL: 9.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



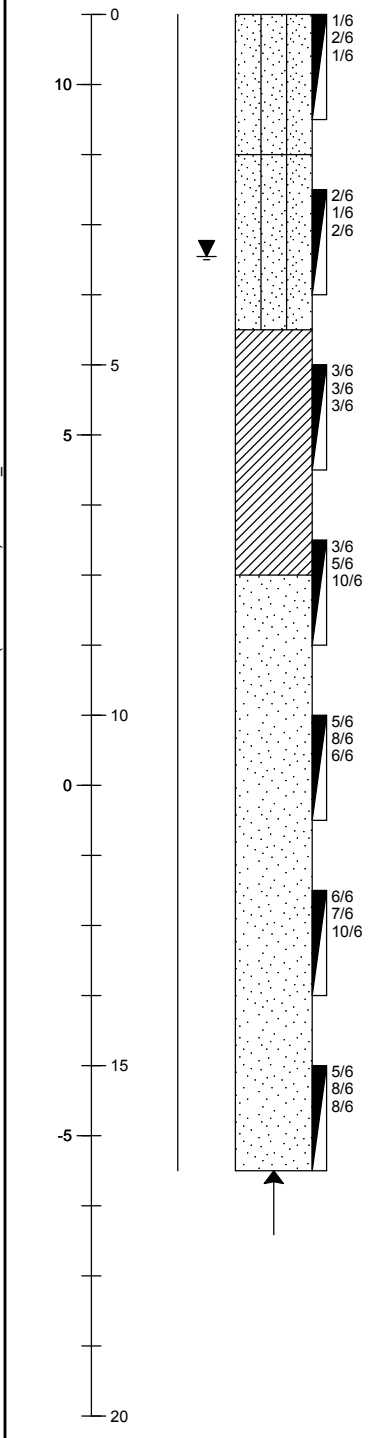
Elevation / Depth	USCS	Description	SPT N	NM %	LL %	200 %
	SM	Loose Brown and Tan Silty Fine SAND	5			
			6	17.2		19
			8			
	CH	Medium to Stiff Orange and Tan CLAY with Trace Sand	10	23.7	63	93
			11			
	SP	Medium White to Gray Fine SAND	16			
			27			

Remarks:

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LOG OF BOREHOLE NO. B-12

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 11 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 3.5 ft
WATER LEVEL DATE: 03/17/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



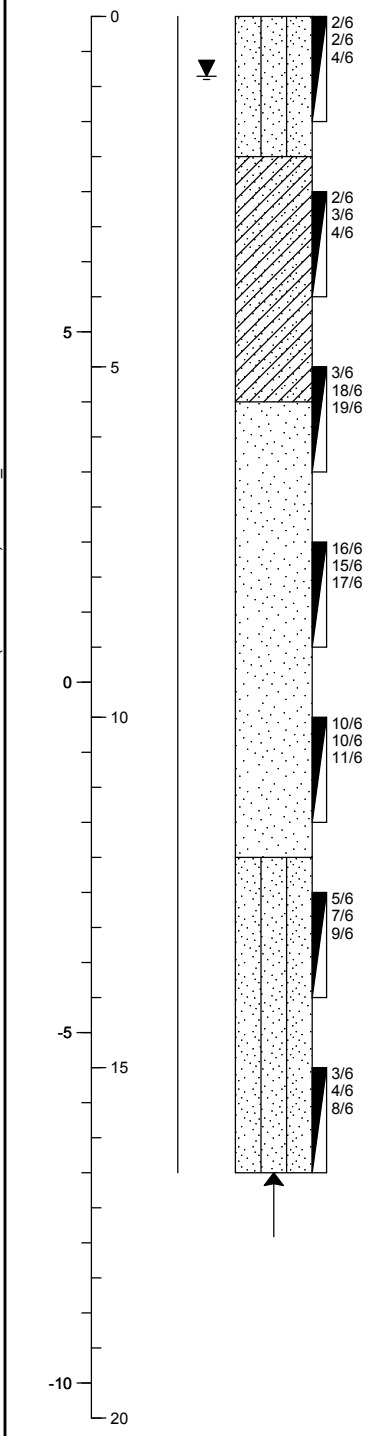
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		SM	Very Loose Dark Brown Silty Fine Sand with Organics	3			
		SM	Very Loose Tan Silty Fine SAND	3			
		CL	Medium Gray Sandy CLAY	6	50.5	33	89
		SP	Medium Tan, Brown and White Fine SAND	15			
				14			
				17			
				16			

Remarks:

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LOG OF BOREHOLE NO. B-13

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 9.5 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 0.9 ft
WATER LEVEL DATE: 03/14/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



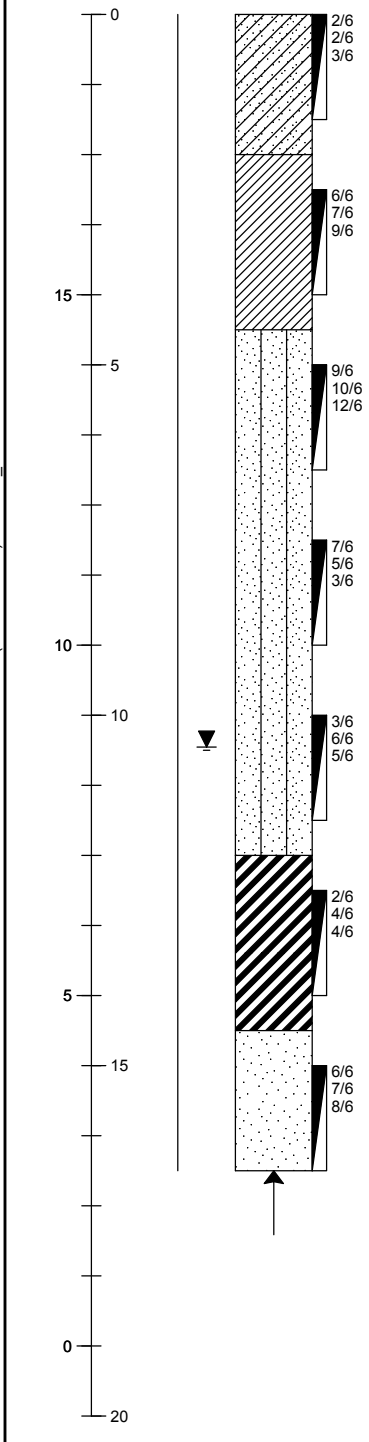
Elevation / Depth	USCS	Description	SPT N	NM %	200 %
	SM	Very Loose Gray Silty Fine SAND	6	18.4	30
	SC	Loose Gray Clayey SAND	7	33.7	41
	SP	Medium to Dense White to Brown and Tan Fine SAND	37 32 21		
	SM	Medium Brown Silty Fine SAND with Organics	16	91.5	21
			12		

Remarks:

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LOG OF BOREHOLE NO. B-14

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 19 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 10.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



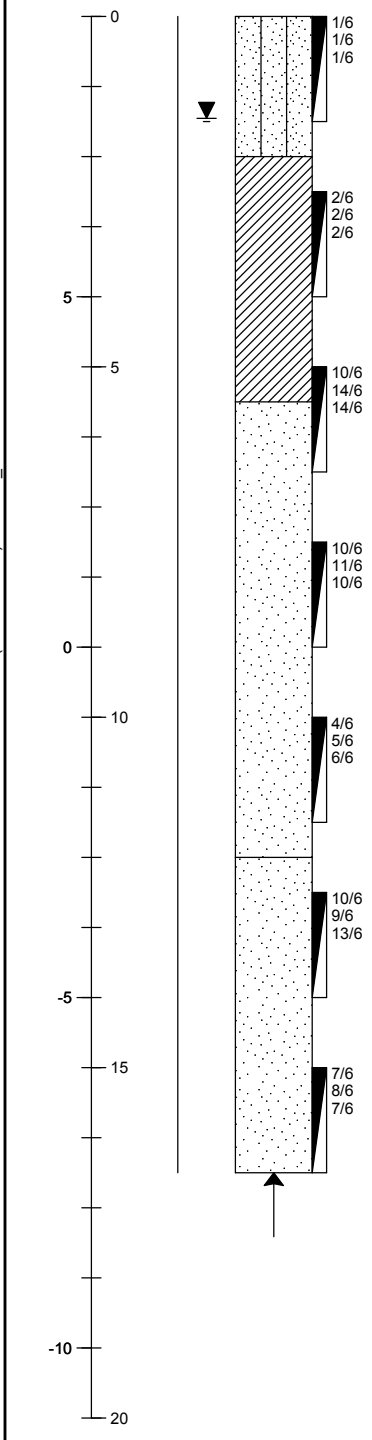
Elevation / Depth	USCS	Description	SPT N	NM %	LL %	200 %
	SC	Loose Brown and Tan Silty Fine SAND	5			
	CL	Stiff Orange and Tan Sandy CLAY	16	17.3	25	45
	SM	Loose to Medium Orange and Tan Silty Fine SAND	22			
			8	17.4		17
			11	21.8		35
	CH	Medium Orange and Gray CLAY with Trace Sand	8			
	SP	Medium White and Tan Fine SAND	15			

Remarks:

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LOG OF BOREHOLE NO. B-15

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 9 ft
DATE DRILLED: 03/17/08
DATE COMPLETED: 03/17/08
WATER LEVEL: 1.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



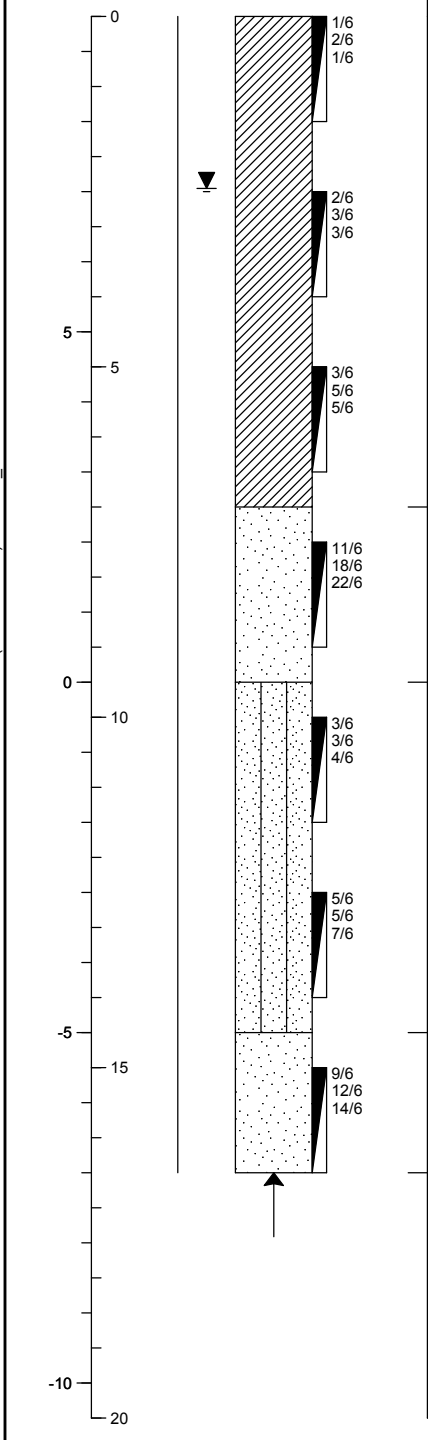
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
		SM	Very Loose Gray and Tan Silty Fine SAND	2	19.8	34
		CL	Soft Orange and Tan Sandy CLAY	4		
		SP	Medium Tan to White and Gray Fine SAND	28		
				21		
				11		
		SP	Medium Dark Brown Fine Sand with Organics	22	22.2	2
				15		

Remarks:

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LOG OF BOREHOLE NO. B-16

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 9.5 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 2.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



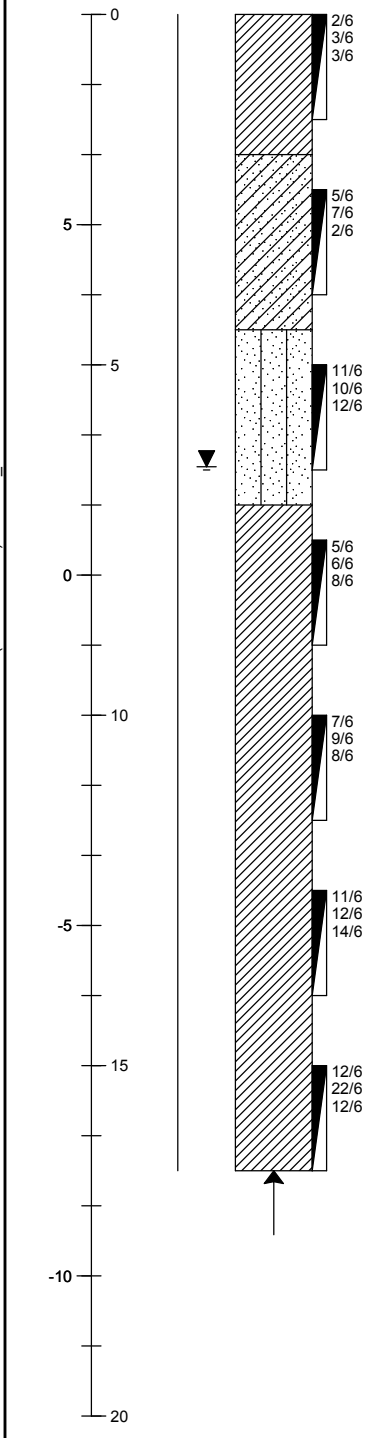
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		CL	Soft to Medium Gray and Orange Sandy CLAY	3	19.4		60
				6	33.3	27	59
				10			
		SP	Dense White and Gray Fine SAND	40			
		SM	Loose to Medium Gray Silty Fine SAND	7			
				12			
		SP	Medium Brown and Tan Fine SAND with Organics	26			

Remarks:

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LOG OF BOREHOLE NO. B-17

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 8 ft
DATE DRILLED: 03/13/08
DATE COMPLETED: 03/13/08
WATER LEVEL: 6.5 ft
WATER LEVEL DATE: 03/18/08
GEOL / ENGR: G. FORSYTHE
DRILLER: D. GARDNER



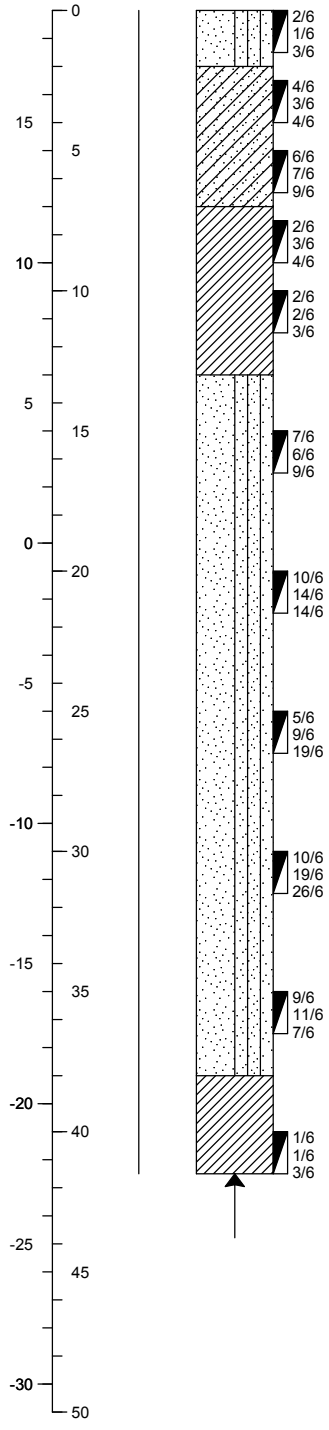
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
		CL	Medium Orange and Gray Sandy CLAY	6	21.0	27	60
		SC	Loose Orange and Gray Clayey Fine SAND	9	16.1		41
		SM	Medium Orange and Gray Silty Fine SAND	22			
		CL	Medium to Hard Gray Sandy CLAY	14			
				17			
				26	23.3	32	85
				34			

Remarks:

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LOG OF BOREHOLE NO. RB-4

PROJECT: RIVERINE TRAINING FACILITY
SESI PROJECT: 08-028
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
METHOD: MUD ROTARY
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: 19 ft
DATE DRILLED: 12/20/06
DATE COMPLETED: 12/20/06
WATER LEVEL: NOT MEASURED
WATER LEVEL DATE:
GEOL / ENGR: G. FORSYTHE
DRILLER: M. CONNIFF



USCS	Description	SPT N	NM %	200 %
SP-SM	Loose Tan & Gray Fine SAND with Some Silt & Organics	4		
SC	Loose to Medium Tan, Gray & Yellow Clayey Fine SAND	7		
		16	14.2	31
CL	Medium Gray & Orange CLAY with Trace Sand	7		
		5		
SP-SM	Medium to Dense Gray, Tan & Brown Fine SAND with Some Silt	15		
		28		
		28		
		45		
		18		
CL	Soft Gray CLAY with Trace Sand	4		

Remarks: Ground water table not measured due to collapse of borehole.
This boring performed for a previous exploration for this project (SESI M06-462)

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APPENDIX C

LABORATORY TEST DATA

Materials Testing Report	SOUTHERN EARTH SCIENCES, inc.	Tabulated Data Sheet
Client:	URS Corporation	Date: 03/10/08
Project:	Riverine Training Facility - Preferred Site - Stennis Space Center	SESI Project No. 08-028

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-1	S-1	0.0-1.5	CL	32.0			76.0
B-1	S-2	2.5-4.0	CL	30.8	27	10	82.4
B-1	S-3	5.0-6.5	SP-SM	22.7			7.1
B-1	S-4	7.5-9.0	CL	20.7	30	13	81.0
B-1	S-9	25.0-26.5	SP	26.1			4.0
B-2	S-1	0.0-1.5	SC	22.4			43.6
B-2	S-2	2.5-4.0	SC-SM	19.3	20	5	41.5
B-2	S-3	5.0-6.5	CH	23.0	51	24	70.1
B-2	S-9	25.0-26.5	SP	26.6			3.7
B-3	S-1	0.0-1.5	CL	0.0			73.8
B-3	S-2	2.5-4.0	CL	26.0			76.4
B-4	S-5	10.0-11.5	CH	53.6	80	50	98.2
B-4	S-6	12.5-14.0	SP	18.3			2.3
B-4	S-8	20.0-21.5	SP	17.0			5.0
B-5	S-3	5.0-6.5	SM	13.9			17.1
B-5	S-5	10.0-11.5	CH	32.7	54	26	93.3
B-6	S-1	0.0-1.5	CL	18.8			73.4

Reviewed:

Materials Testing Report	SOUTHERN EARTH SCIENCES, inc.	Tabulated Data Sheet
Client:	URS Corporation	Date: 03/10/08
Project:	Riverine Training Facility - Preferred Site - Stennis Space Center	SESI Project No. 08-028

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-6	S-2	2.5-4.0	CL	19.2			73.2
B-6	S-3	5.0-6.5	CL	22.9			67.3
B-7	S-2	2.5-4.0	SC	20.8			41.0
B-7	S-5	10.0-11.5	SM	27.6	21	0	39.7
B-7	S-6	12.5-14.0	CH	51.2	61	33	95.1
B-8	S-1	0.0-1.5	SC	14.6			46.9
B-8	S-2	2.5-4.0	SC	18.9			44.2
B-8	S-3	5.0-6.5	SM	22.0	20	1	23.4
B-8	S-4	7.5-9.0	MH	72.9	58	21	98.6
B-9	S-1	0.0-1.5	SC	21.1			49.2
B-9	S-3	5.0-6.5	SP-SM	20.8			6.5
B-10	S-2	2.5-4.0	SM	17.5			35.0
B-10	S-3	5.0-6.5	SC	20.9			44.5
B-11	S-2	2.5-4.0	SM	17.2			19.4
B-11	S-4	7.5-9.0	CH	23.7	63	38	92.7
B-12	S-3	5.0-6.5	CL	50.5	33	17	89.3
B-13	S-1	0.0-1.5	SM	18.4			30.4

Reviewed:

Materials Testing Report	SOUTHERN EARTH SCIENCES, inc.	Tabulated Data Sheet
Client:	URS Corporation	Date: 03/10/08
Project:	Riverine Training Facility - Preferred Site - Stennis Space Center	SESI Project No. 08-028

LABORATORY TEST DATA

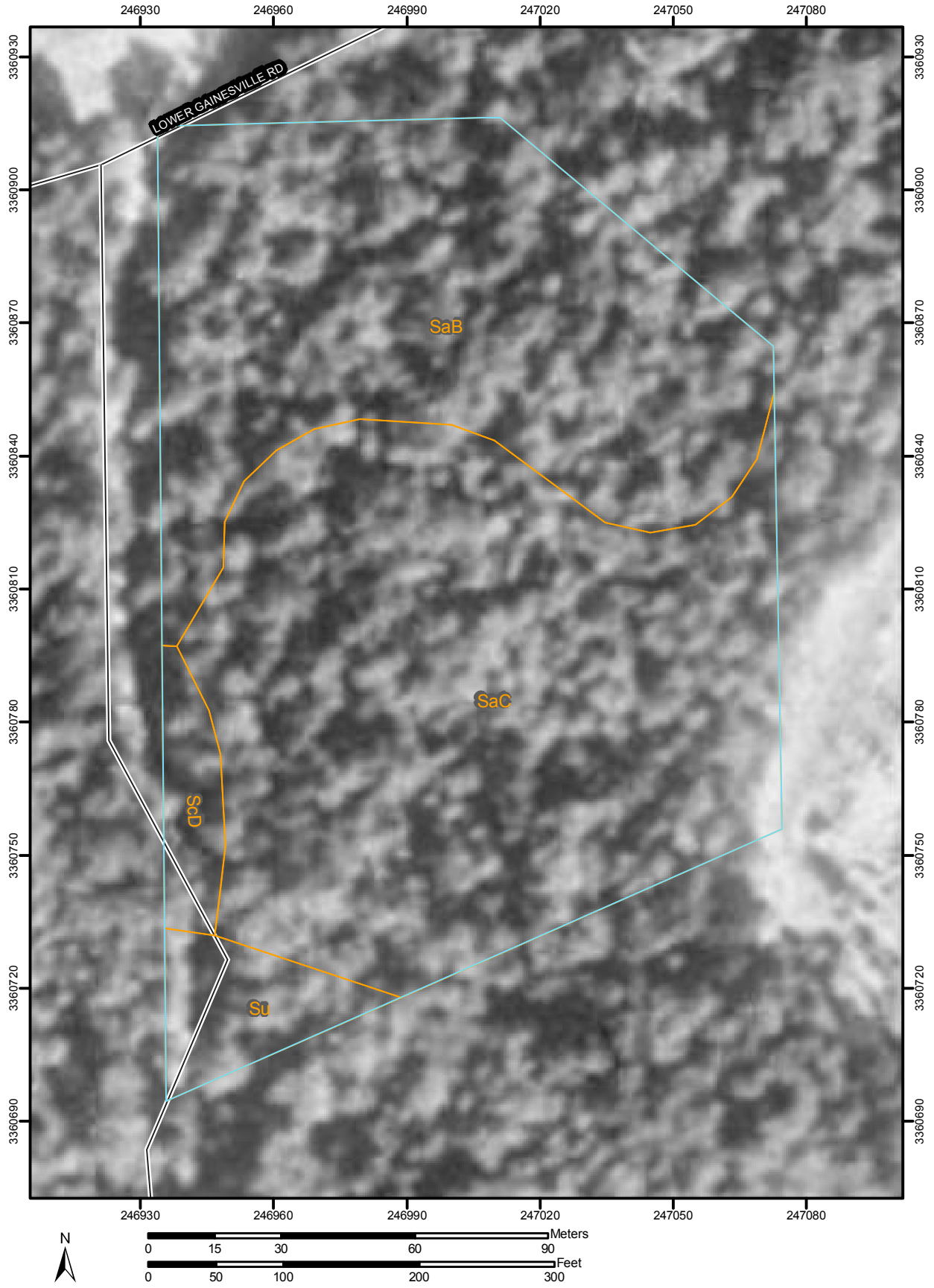
Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-13	S-2	2.5-4.0	SC	33.7			41.2
B-13	S-6	12.5-14.0	SM	91.5			21.2
B-14	S-2	2.5-4.0	SC	17.3	25	11	44.7
B-14	S-4	7.5-9.0	SM	17.4			16.7
B-14	S-5	10.0-11.5	SM	21.8			35.1
B-15	S-1	0.0-1.5	SM	19.8			34.1
B-15	S-6	12.5-14.0	SP	22.2			2.1
B-16	S-1	0.0-1.5	CL	19.4			59.9
B-16	S-2	2.5-4.0	CL	33.3	27	11	58.6
B-17	S-1	0.0-1.5	CL	21.0	27	14	60.2
B-17	S-2	2.5-4.0	SC	16.1			41.1
B-17	S-6	12.5-14.0	CL	23.3	32	18	84.9

Reviewed:

APPENDIX D

NRCS SOIL DATA

Soil Map–Hancock County, Mississippi
(Riverine Training Facility - Preferred Site)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hancock County, Mississippi
Survey Area Data: Version 7, Feb 5, 2008

Date(s) aerial images were photographed: 10/25/1989

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hancock County, Mississippi (MS045)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
SaB	Saucier fine sandy loam, 2 to 5 percent slopes	2.4	39.2%
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	3.3	53.5%
ScD	Saucier-Susquehanna complex, 5 to 12 percent slopes	0.2	3.0%
Su	Smithton fine sandy loam, frequently flooded	0.3	4.3%
Totals for Area of Interest (AOI)		6.1	100.0%

ATTACHMENT 5

LIST OF RECORD DRAWINGS

LIST OF RECORD DRAWINGS
RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY
JOHN C. STENNIS SPACE CENTER [SSC], MISSISSIPPI

DWG. NO.	TITLE
	NOTE: DRAWINGS LISTED BELOW ARE PROVIDED IN .PDF FORMAT
12B00-S002	13.8 KV SITE PLAN ELECTRICAL DISTRIBUTION SYSTEM REF. NO. 2
12G00-R002	SITE PLAN POTABLE WATER REF. NO. 2
44000-R249	WATER LINE TO RP-1 DOCK PLAN & PROFILE DETAILS
44000-S405	ELECTRICAL PLAN
	SOF OPS AND MAINTENANCE FACILITIES, PKG.1
T01	COVER SHEET
T02	INDEX OF DRAWINGS
T03	ABBREVATIONS AND SYMBOLS
T04	PROJECT SIGNBOARD DETAILS
T05	PROJECT SIGNBOARD DETAILS
OC01	UTILITY DETAILS NO. 1
OC02	UTILITY DETAILS NO. 2
OC03	DRAINAGE DETAILS
OC04	PAVING DETAILS
OC05	FENCING DETAILS
OC06	MISCELLANEOUS DETAILS
OC07	SEWER PLAN & PROFILES
OM01	MECHANICAL LEGEND & GENERAL NOTES
OM02	MECHANICAL DETAILS
OP01	PLUMBING LEGEND AND SCHEDULE
OE01	ELECTRICAL LEGEND
OE02	LIGHTING FIXTURE DETAILS
OE03	LIGHTING FIXTURE DETAILS
2C01	SITE 2 OVERALL KEY PLAN
2C02	SITE2 EXIST. COND. AND DEMO. @ BOAT YARD
2C03	SITE 2 EXIST. CONDITIONS & DEMO. AT PIER
2C04	SITE 2 EXIST. COND. & DEMO. AT QUAY WALL
2C05	SITE 2 PLAN AT BOAT YARD
2C06	SITE 2 PLAN AT PIER
2C07	SITE 2 GRADING & DRAIN. PLAN AT BOAT YARD
2C08	SITE 2 UTILITIES PLAN AT BOAT YARD
2C09	SITE 2 UTILITIES PLAN AT PIER
2A01	KEY PLAN – STENNIS, SITE 2
2A02	SITE PLAN – BOAT YARD
2A03	SITE PLAN – PIER AND WALKWAY
2A04	SITE PLAN – QUAY WALL AND BOAT RAMP
2A05	FLOOR PLANS – BOAT MAINT. AND STORAGE
2A06	SECTIONS – BOAT MAINT. AND STORAGE
2A07	ENLARGED PLANS AND ELEV. – TOILET ROOM
2A08	DETAILS – SITE 2
2S00	GENERAL NOTES
2S01	BOAT STORAGE BLDG – FOUNDATION PLAN

DWG. NO.	TITLE
2S02	BOAT MAINTENANCE BUILDING FDN PLAN AND DETAILS
2S10	PLAN – PIER AND WALKWAY
2S11	PLAN – QUAY WALL AND BOAT RAMP
2S12	SECTIONS & DETAILS
2S13	SECTIONS & DETAILS
2S14	SECTIONS & DETAILS
2M01	MECHANICAL SCHEDULES
2M02	BOAT MAINT AND STO PLANS – MECH
2M03	MECHANICAL SEQUENCE OF OPERATIONS
2P01	BOAT MAINTENANCE PLANS – PLUMBING
2E01	SITE PLAN 2 – BOAT YARD – ELEC
2E02	BOAT MAINTENANCE PLANS – ELECTRICAL
2E03	BOAT STORAGE PLANS – ELECTRICAL
2E04	POWER RISER DIAGRAMS
2E05	ACCESS CONTROL RISER DIAGRAM
2E06	SITE PLAN 2 – PIER – ELEC
2E07	SITE PLAN – QUAY WALL – ELEC
	NOTE: AVAILABLE DRAWINGS OF FOLLOWING FACILITIES ARE PROVIDED IN .PDF FORMAT
	SITE SUPPORT FACILITY BINDER 1 OF 4 (SET OF DRAWINGS)
	HQ & MAINTENANCE FACILITIES BINDER 2 OF 4 (SET OF DRAWINGS)
	DET & SUPPLY FACILITY BINDER 3 OF 4 (SET OF DRAWINGS)
	NAVSCIATTS FACILITIES BINDER 4 OF 4 (SET OF DRAWINGS)

ATTACHMENT 6

CONTRACTOR DATA REQUIRED FOR DD FORM 1354

CONTRACTOR DATA
REQUIRED FOR DD FORM 1354

Building Number _____

Building(A facility may have multiple category codes included)

Prime Use(Facility)

Category Code/Description _____
SF _____
Length LF _____
Width LF _____
Height LF _____
Number of Floors _____
Construction Cost $ _____

Other facility usages contained within the Prime facility

Category Code/Description _____
SF _____

Category Code/Description _____
SF _____

Category Code/Description _____
SF _____

Total Facility Construction Cost $ _____

Parking Lots(CCN 852-10)
SY _____
Percent of Total Construction Cost _____

Sidewalks(CCN 852-20)
SY _____
Percent of Total Construction Cost _____

Roads(CCN 851-10)
SY _____
MI _____
Percent of Total Construction Cost _____

Security Fence(CCN 872-10)
LF _____
Percent of Total Construction Cost _____

Interior Fence(CCN 872-15)
LF _____
Percent of Total Construction Cost _____

Exterior Lighting(CCN 812-20)
LF _____
EA _____
Percent of Total Construction Cost _____

Overhead Electrical Distribution Line(CCN 812-31)
LF _____
Percent of Total Construction Cost _____

Under Ground Electrical Distribution Line(CCN 812-32)
LF _____
Percent of Total Construction Cost _____

Potable- Water Distribution Line(CCN842-10)
LF _____
Percent of Total Construction Cost _____

Sanitary Sewer(CCN 832-20)
LF
Percent of Total Construction Cost _____

Storm Sewer(871-10)l
LF _____
Percent of Total Construction Cost _____

Notes:

1. Other (outbuildings, such as storage sheds, guard houses, or any other facility not listed above.

2. General Note – Some facilities have more than one unit of measure (Warehouses, for example), and you would need all three quantities.

ATTACHMENT 7

SSC FACILITY ELECTRICAL STANDARD

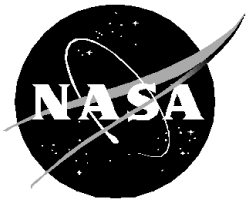
(Where conflicts arise between the SSC Facility Electrical Standard document and the Unified Facilities Criteria (UFC) documents, the UFC requirements shall take precedence)

SSTD-8070-0081-ELEC
Revision Basic
December 2001

John C. Stennis Space Center
SSC Facility Electrical Standard

Original signed by

W. Kirk Miller
NASA SSC Center Operations
Engineering Services Division
Design Branch



Robert J. Heitzmann
NASA SSC Center Operations
Engineering Services Division
Operations and Maintenance Branch

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

Issued by

Issued CEF 12/18/2001
Central Engineering Files

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Document History Log

Status/ Change/ Revision	Change Date	Originator / Phone	Description
Basic	12/14/01	Roy Worthy 8-1820	Initial release – supersedes SSC STD 50-008, Revision A, with the following changes: New document number and format per SPG 1400.1; Throughout the document, edits and rewrites for content changes, and English units of measure added in parentheses after metric units; Table of Contents changed to reflect text mods and reorganizations; 2.0 adds, deletes and changes per text references and changes in document numbering; 3.0 retitled and text added for Responsibilities; 4.3 title change 'Guide' to 'Regulations'; 5.1.1-b change allows NASA Technical Monitor to determine data format; 5.1.1-h added new for panel schedule and changed 'field engineer' to 'construction monitor'; 5.2-NOTE delete CFR ref and allow substitutions as approved by the NASA Technical Monitor; 5.3-g delete High-Voltage System Engineer and have requirements specified by the NASA Technical Monitor only; 5.4-a & -b delete refs to NEC tables; 5.6.1 change requirement from # 8 AWG to # 10 AWG; 5.6.2 delete subsection Fire Alarm Circuits and Wiring Color Codes and renumber subsequent subsections; 5.7 delete CFR ref; 5.7-f change # 8 AWG to # 10 AWG, delete 'solid' copper requirement, add 'for circuits over 250V' for spring tension connectors; 5.7-g add for split lug connectors if crimping not possible, add 'first with rubber' to double wrap requirement; 5.7-i delete ref to ANSI C37.20.1; 5.8.1-e delete 'control' and add 'unless approved by NASA Technical Monitor'; 5.8.2-h allow EMT on exterior installations if not subject to extreme weather, mechanical damage or hazardous areas; 5.8.2-i add that pull strings be weather resistant; 5.8.2-k add trace tape requirement; 5.8.3-a complete rewrite delete diameter and metallic tubing requirements; 5.8.3-b delete (Security and Fire Alarm Systems) and renumber all subsequent steps; 5.8.3-e add that pull strings be weather resistant; 5.9-NOTE delete ref to 29CFR1910; 5.9.3 limit copper winding requirement only to dry transformers >75 kVA; 5.9.5 change '2-2.5%' to 'two 2.5%'; 5.9.6-a change non-linear loads from 40% to 25% and change '2-2.5%' to 'two 2.5%'; 5.9.6-b last sentence put first, bold; 5.9.7 delete refs to NPA 70, ANSI/IEEE C2 and 29 CFR 1910; 5.10 Distribution Switchboards moved to 5.12; 5.18 Motors moved to 5.10; 5.11 reorganized and merged with previous sections 5.19 Motor Starters, 5.20 Manual Starter, and 5.21 Motor Control Schematic Wiring Diagram, and subsequent sections appropriately renumbered, with the following changes: 5.10-a delete refs to NEMA Std MG1-12.53 and IEEE 112; 5.10-c, -d, -e add footnote to consult with NASA Technical Monitor for substitutions if motor or power vary from specified ranges; 5.11.1-b apply padlock provision to all devices; 5.11.2-b change copper bus to plated copper bus; 5.11.5 text rearranged; 5.11.2-g delete '(ea.)' in two places; 5.12-h change copper

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			to plated copper for busses rated 225 amps or higher with other bus materials approved by the NASA Technical Monitor and neutral bus fully rated; 5.12-l delete refs to ANSI/IEEE C2, NFPA 70, and 29 CFR 1926; 5.12-m add new to use main breakers when required by NEC; 5.13-b change same as in 5.12-h above; 5.13-h delete ref to NEC table; 5.14-d change copper to plated copper for busses rated 225 amps or higher; 5.14-k delete ref to NEC table; 5.14-s change single-phase panel boards from acceptable to unacceptable, unless approved by NASA Technical Monitor; 5.15.1-f change water fountain receptacle requirement from single to GFCI; 5.18-a delete ref to NEC Article 620-51; 5.18-b delete ref to NEMA spec KS1-1975; 5.20-a change NASA Facilities Engineering Division to NASA Technical Monitor; 5.20-c delete breakrooms & corridors, and list restrooms with the exceptions; 5.21-d delete ref to NFPA 101 paragraph 31-1.3.8; 5.21-e add new for auto test and diagnostic routine; 5.23-d delete refs to NEC Articles 645 & 685; 5.21-j add new for battery cell cabinet maintenance; 5.25 FIRE ALARMS delete all 9 subsections, change NOTE to paragraph format and add ref to NASA Std 8719.11; 5.26-a delete ref to NEC Article 250; 5.26-f delete ref to NEC 250-94; 5.26-n delete ref to IEEE Std 81; 5.27-e relax requirement for copper only by add of qualifiers and that all materials must be approved by the NASA Technical Monitor; 5.28-f change '10 pole switches' to '10-pole switches'; Appendix A adds, deletes and changes per text changes and edits.

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1.0 INTRODUCTION

1.1 PURPOSE

This Stennis Standard (SSTD) is intended to be a guideline for Stennis Space Center (SSC) and its contractors, for the design, construction, and maintenance of facilities at SSC. Information herein is general in nature and should be supplemented by general and detailed individual project requirements from the customer(s) and the NASA SSC Center Operations and Support Directorate, Engineering Services Division (ESD) Design Branch and Operations & Maintenance Branch.

1.2 SCOPE AND APPLICABILITY

This SSTD contains the basic engineering criteria and design guidance for the design and construction of electrical systems at SSC. Electrical systems include power generation and distribution, lighting, uninterruptible power sources, security, fire alarm, and communications networks. The customers for electrical design and construction include, but are not limited to, the facility occupants, system users, NASA SSC Center Operations and Support Directorate, ESD, the maintenance organization, and the funding organization. Organizations or individuals responsible for or engaged in facilities design and construction, and/or the use of electricity at SSC, shall incorporate the applicable information outlined in this SSTD in their designs and electrical installations.

1.3 OBJECTIVE

The primary objectives of this SSTD are safety, excellence in electrical design, simplified construction, standardization for ease of maintenance and operation, and compliance with recognized codes, standards, and guides.

1.4 DEVIATIONS

The Electrical Design Engineer may override requirements of this Standard with concurrence of the NASA SSC ESD Project Manager (PM); however, the Electrical Design Engineer does not have authority to override any national codes or federal regulations. Any deviation that does not have this concurrence will be resolved by the SSC Facility Review Board (FRB). Note: All deviations must be noted and flagged on all applicable drawings.

1.5 CONTROL OF STANDARD

Revision or cancellation of this SSTD shall be reviewed and approved as specified in SSC STD 99-008.

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2.0 REFERENCED AND APPLICABLE DOCUMENTS

The latest edition of the following codes, standards and guides shall be followed unless otherwise specified in the specification document. (Refer to Section 4.3.)

DOC. NO.	TITLE
29 CFR 1910.147	The Control of Hazardous Energy (Lockout/Tagout)
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
42 U.S.C. 6311, Section 340	Energy Policy and Conservation Act
AMCR 385-100	Army Safety Manual
ANSI C2	National Electrical Safety Code
ANSI C37.20.1	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
ANSI C57	Distribution, Power, and Regulating Transformers
ANSI/IEEE 386	Separable Insulated Connectors
ANSI/IEEE C57.110	Recommended Practice for Establishing Transformer Capability When Supplying Non-sinusoidal Load Currents
ANSI/IEEE C62.11	Metal-Oxide Surge Arresters for Alternating Current Power Circuits
ASTM C 1089-88	Standard Specification for Spun Cast Prestressed Concrete Poles
IEEE 112	Standard Test Procedure for Polyphase Induction Motors and Generators
IEEE Standard 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
LPI-175	Lightning Protection Specification
NASA STD 8719.11	Safety Standard for Fire Protection
NEC Article 250	Grounding
NEC Article 384	Switchboards and Panelboards
NEC Article 500	Hazardous (Classified) Locations
NEC Article 645	Information Technology Equipment
NEC Article 685	Integrated Electrical Systems
NEMA Specification KS1	Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Max.)
NEMA Standard MG1-12.53 (a)	Motors and Generators
NEMA Standard MG1-12.53 (b)	Motors and Generators
NFPA 101	Life Safety Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code

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NFPA 780	Lightning Protection
NPG 8820.2	Facility Project Implementation Handbook
NPG 8715.3	NASA Safety Manual
NSTS 07636	Lighting Protection Criteria Document
SPG 1400.1	Document Preparation, Numbering and Management Guidelines
SPG 8715.1	SSC Safety and Health Procedures and Guidelines
SSLP-1440-0001	SSC Records Management Program and Control of Quality Records
SSC STD 50-002	Lighting Standard Design for Energy Conservation
SSC STD 99-006	Preparation of Construction Specifications
SSC STD 99-008	Preparation, Revision, Approval and Release of SSC Standards
SSC STD 99-020	Standard for the 13.8 kV Distribution System
SSTD-8070-0001-CONFIG	Facilities Engineering Documentation Standard
SSTD-8070-0002-CONFIG	Facilities Drafting Manual
UL 1561	Safety Dry-Type General Purpose and Power Transformers
(not numbered)	NASA SSC Environmental Resources Document

3.0 RESPONSIBILITIES

Responsibilities for the requirements and applications of this SSTD are as specified in the text herein. All users of this SSTD shall ensure they use the correct version in accordance with SSC STD 99-008.

4.0 GENERAL REQUIREMENTS

4.1 PHYSICAL SECURITY

Site and project specific electrical security requirements will be developed with the advice and assistance of the NASA Security Office.

4.2 ENVIRONMENTAL, SAFETY AND HEALTH (ES&H)

In matters of facility design, construction, operations, and maintenance, the safety and health of the employees and public, and mitigation of any possible impact to the environment take precedence over other aspects, such as function, cost or expediency. ES&H facility performance objectives shall comply with applicable provisions of the latest edition of NASA/SSC Environmental Resources Document (ERD) and SPG 8715.1.

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4.3 CODES, STANDARDS, AND REGULATIONS

The design and installation of electrical systems shall comply with the current edition of NPG 8820.2, NFPA 70 (National Electrical Code), ANSI C2 (National Electrical Safety Code), and the Occupational Safety and Health Act (OSHA) 29 CFR 1910 and 29 CFR 1926. Applicable standards of the American National Standards Institute (ANSI), American Society for Testing and Material (ASTM), Illuminating Engineering Society (IES), National Electrical Manufacturers Association (NEMA), Insulated Power Cable Engineers Association (IPCEA), National Fire Protection Association (NFPA), and Underwriters Laboratory (UL) reflect current electrical industry standard practice and should be used for establishing quality of materials and equipment. All of the aforementioned documents shall be applied to all sections of this SSTD, whether cited specifically or not.

4.4 OPERATION AND MAINTENANCE

The design, equipment selection, and construction of the electrical systems should consider anticipated operation and maintenance requirements as defined by approved requirements document. Apparatus and system connections should be of simple and straightforward design to facilitate both normal and emergency functions of operating and maintenance personnel. All electrical equipment shall include provisions for lockout devices in accordance with 29 CFR 1910.147.

NOTE

To ensure accurate and timely numbering/labeling of facility electrical equipment and update of the Computerized Maintenance Management System (CMMS), all new facility electrical equipment, and the CMMS tag numbers of all removed facility electrical equipment, shall be reported to the Facility Operating Services contractor (FOSC) Real Property Specialist.

4.5 DRAWINGS AND SPECIFICATIONS

a. The approved drawings and specifications are contract documents and shall be prepared to complement each other. Every attempt shall be made to ensure that drawings and specifications are not in conflict.

b. Guide Specifications (SPECSINTACT) will be made available at Stennis Space Center. The designer shall edit the specifications based upon the requirements for each design. The designer is responsible for removing portions of the specifications that do not apply to his or her design and editing the specification to comply with this standard. (Refer to SSC STD 99-006.) **Please note that Guide Specifications are not to be construed as design standards.**

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c. Drawings and specifications are to be prepared in accordance with the Facilities Engineering Documentation Standard (SSTD-8070-0001-CONFIG) and the Facilities Drafting Manual (SSTD-8070-0002-CONFIG). Standard symbols for electrical drawings are contained in the SSTD-8070-0002-CONFIG.

d. Provisions for tag and lockout shall be specified in applicable subsections of all construction and procurement specifications.

5.0 ELECTRICAL DESIGN AND CONSTRUCTION GUIDANCE

Electrical loads and requirements shall be estimated for 5-year load projections. Facilities shall be designed accordingly and in compliance with applicable codes, taking into account operation and maintenance requirements.

NOTE

Provide a dedicated electrical equipment room in every project, except for modification projects where power can be supplied from an existing electrical equipment room. Avoid installing electrical equipment in hallways, stair landings, etc, to provide an unimpeded means of egress as required by NFPA 101. Size electrical equipment rooms and arrange equipment to provide adequate clear space for maintenance, inspection, and repair or replacement. Size the electrical equipment room based on the actual or maximum possible dimensions of all electrical equipment that will be installed in the room. Provide at least one general purpose receptacle in each electrical equipment room.

5.1 REQUIREMENTS DOCUMENTS

An approved requirements document is required prior to beginning the technical design process for all electrical designs, including those that are part of a larger design. Incorporate all requirements identified in the latest revision of the requirements document.

For the purposes of this standard, new or revised requirements documents shall be approved by NASA SSC ESD Operations & Maintenance Branch, and Design Branch, NASA SSC Safety and Mission Assurance (S&MA), the funding organization, the designing organization, the Operating and Maintenance (O&M) organization, and the end user of the facility or system. For the purposes of this standard, requirements documents are not required to be in any specific format.

5.1.1 General Requirements

a. As a minimum, design in accordance with the latest issue of the National Electrical Code (NEC), Design Safety Requirements for Electrical Systems (29 CFR 1910), Section 340

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of the Energy Policy and Conservation Act (42 U.S.C. 6311), and as specified herein or in the requirements document. Incorporate any additional and/or more stringent requirements specified herein or in the requirements document.

b. For large electrical designs, perform electrical load analysis, coordination study, voltage drop analysis, conductor sizing and other design calculations as required by the NASA Technical Monitor. Perform a fault current analysis starting with the available short circuit megavoltampere (MVA) (1000 kVA) at the point of service to the facility transformers and computing the minimum rating for all fuses, circuit breakers, panelboards, bussing, etc. Ensure that the primary feeder has adequate spare capacity to supply the added load imposed by the proposed project. Submit this data to the NASA Technical Monitor in SKM Power Tools for Windows or other electronic format as approved by the NASA Technical Monitor. Submit final approved copies of this data to Central Engineering Files (CEF).

c. The SSC Fire Department and NASA SSC S&MA shall be invited to participate in all design reviews that include fire protection systems.

d. The SSC High-Voltage System Engineer shall be invited to participate in all design reviews that include the high voltage distribution system. The SSC High-Voltage System Engineer shall be required to concur with all designs that effect the high-voltage distribution system. Concurrence shall be provided by signature on drawings and specifications prior to approval and construction.

e. All electrical equipment shall be UL listed and shall conform to Factory Mutual (FM) Standards as applicable. Exceptions shall be approved by the Technical Monitor.

f. All electrical control equipment shall be date compliant for the year 2000 and beyond, and submittal of manufacturer's certification of compliance shall be forwarded to CEF prior to use of the equipment.

g. All dimensions shall be in International System (SI) Metric units of measure.

h. All electrical designs shall provide an updated panel schedule (if affected) with the design package. The latest panel board schedule can be provided from Central Engineering Files (CEF) and should be compared with the panel schedule in the field (if available). If there are differences of a significant nature, or no field schedule is available, inform the Contracting Officer’s Technical Representative, NASA PM or the FOSC construction monitor for resolution. Once this work has been completed, the contractor or shops performing this work shall ensure this updated panel schedule is installed in/on the panel board.

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5.1.2 Drawings. Drawings of existing facilities will be made available at Stennis Space Center, but they should not be interpreted as "as built" conditions. The designer is responsible for the accuracy of the drawings based on field verification and the latest information available.

5.1.3 Design And Construction Implementation Plan. As a minimum for all projects, a Gantt chart in Microsoft Project format is required. For all projects with projected design value over $5,000, an integrated schedule, in Microsoft Project (latest revision) format, is required. This integrated schedule shall include as a minimum all electrical tasks from funds request to project completion and activation.

5.1.4 Design And Construction Cost Estimate. Design and construction cost estimates shall be calculated for all electrical projects in sufficient detail to generate a schedule of values that includes as a minimum major electrical equipment items, miscellaneous electrical material, and labor.

5.2 ENCLOSURES

NOTE

All enclosures shall comply with OSHA requirements. Substitutions must be approved by NASA Technical Monitor.

5.2.1 Exterior Enclosures. All exterior enclosures shall be NEMA Type 4X for non-classified locations and NEMA Type 8 for classified locations, unless specific site operating conditions require more protection.

5.2.2 Interior Enclosures. All interior enclosures shall be NEMA Type 1 for non-classified locations and NEMA Type 8 for classified locations, unless specific site operating conditions require more protection.

5.2.3 Enclosures for Damp or Wet Locations. Provide NEMA 3R or NEMA 4X enclosures as required in damp or wet locations, unless specific site operating conditions require more protection.

5.3 EXTERIOR UTILITY SERVICES

NOTE

Primary service at SSC is supplied from NASA's overhead distribution system at 13.8 kV, delta configuration. Please refer to the SSC Standard for 13.8 kV Distribution System (SSC 99-020) for detailed design information. Taps for 13.8 kV primary facility service may be routed underground for aesthetics.

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a. For underground primary feeder cable, use single conductors, copper, 15 kV ungrounded, shielded, 133% insulation level, UL type MV-90 with ethylene-propylene rubber (EPR) insulation. Primary circuits shall be sized No. 1/0 or 500 MCM, depending upon the design load requirements. Taped splices are not acceptable at SSC. All underground splices shall conform to ANSI/IEEE 386.

b. Install primary and secondary feeders in underground concrete encased ducts. Use 150-mm (6") ducts minimum for 500-MCM circuits, and 100-mm (4") ducts minimum for 1/0 circuits. Separate underground ducts from steam, condensate, hot water, chilled water lines and gas lines. Install markers every 200 meters (655') on straight runs, and at each turn for identification of all underground ductbanks.

c. Provide pre-cast concrete manholes, if required, with cast iron covers. The manhole unit shall be designed to withstand the dead load, AASHTO H-20 wheel live load, and any horizontal earth pressures imposed by the water table. All exterior surfaces and ductbank penetrations of pre-cast manholes shall be sealed to prevent water penetration. Minimum dimensions shall be 1 800 mm (70") wide by 2 400 mm (95") long by 2 100 mm (83") deep.

d. If 15 kV switches are required for underground service, they shall be pad mounted SF_6 gas insulated, 200- or 600-amp size, with ANSI/IEEE 386 separable connectors.

e. Lightning arrestors for the 13.8 kV distribution system shall be metal-oxide type, with a Maximum Continuous Operating Voltage (MCOV) of 13.8 kV or greater, suitable for application on an ungrounded delta system. Lightning arrestors shall comply with ANSI/IEEE 62.11.

f. For transformer requirements, see Section 5.9 of this standard.

g. Overhead pole lines shall be constructed of treated wood poles conforming to SSC Standards. Pre-stressed concrete poles, conforming to ASTM standards, shall be considered for all main lines and critical taps. Location, accessibility, aesthetics, replacement, and maintenance cost shall be considered in choosing between concrete and wooden poles. The NASA Technical Monitor shall specify the requirement.

h. Primary overhead conductors shall be stranded Aluminum Conductor, Steel Reinforced (ACSR), sized for the anticipated loads plus a minimum 25% growth factor. Minimum conductor size shall be 336,400 Circular Mils for main lines, and #2 for taps. Anticipated loads include projected loads for at least five years beyond the construction date. Insulators shall be rated for 25 kV minimum.

i. Secondary feeders shall be single conductors, copper, with 600 V insulation.

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5.4 INTERIOR BUILDING SERVICES

a. Locate building service equipment as centrally as possible to shorten branch circuits and achieve economies of construction and operations. Locate electrical equipment in rooms or spaces dedicated exclusively to such equipment.

b. Include a plan and elevations of the electrical room in the contract drawings. Indicate on the drawing(s) all required working clearance dimensions. Include a note on the drawing that requires that these dimensions be maintained at all times.

c. Include in the specifications a requirement to mark the required working space clearances around the equipment with striped yellow border on the floor. Indicate the location of this border on the contract drawings.

5.5 EQUIPMENT DESIGNATION

5.5.1 Codes. Designate (code) all electrical equipment with the following designations. Refer to the "Note" in Section 4.4.

NOTE

All prefix codes listed below shall be suffixed with a letter if the utilization voltage is in excess of 250V or with a number if 250V or less. Example: a 480V motor control center will be coded "MCC-A"; a 208V motor control center will be coded "MCC-1". Suffixes shall be applied in ascending order, if more than one unit per structure. Add suffix IG for isolated ground panelboards. Example: PP-A-IG (480V power panelboard with isolated ground).

ATS	Automatic Transfer Switch
BAT	Battery
CHG	Charger (battery)
DIM	Dimmer (lighting)
DP	Distribution Panel
EDP	Emergency Distribution Panelboard
ELP	Emergency Lighting & Appliance Panelboard
EPP	Emergency Power Panelboard
IPC	Instrument Power Conditioner
JB	Junction Box
LP	Lighting & Appliance Panelboard
MCC	Motor Control Center
MCP	Motor Control Panelboard
MDP	Main Distribution Panelboard
MG	Motor-Generator Set

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MTS	Manual Transfer Switch
PDC	Panelboard, Direct Current
PP	Power Panelboard
US	Unit Substation
SW	Non-fused Disconnect Switch
SWB	Switchboard
SWG	Switchgear
T	Transformer (do not use for transformers in unit substations or for instrument transformers)
TB	Terminal Box
UPS	Uninterruptible Power Supply
VFD	Variable Frequency Drive
VSD	Variable Speed Drive

5.5.2 Components. Identify motors and their controllers with the equipment of which they are a component. When a separate disconnect switch is used with a motor controller, label the disconnect switch with the mechanical equipment designator.

5.5.3 Code Tags And Name Plates. Identify all electrical equipment with proper code tags and nameplates.

5.5.4 Nameplate Schedule. The designer shall prepare a nameplate schedule for every project. For small projects with few nameplates required, the nameplate schedule may be shown on any appropriate electrical drawing. Electrical nameplates shall be furnished and installed in accordance with the designations taken from the nameplate schedule(s). The nameplate designation shall include the source of power, its characteristics, the load served, and its location, as a minimum.

5.6 WIRING DESIGNATIONS

5.6.1 Color Codes For Power Wiring. Conductors size 10 AWG and smaller shall be manufactured with colored insulation, and installed according to the following color codes. For larger conductor sizes that are not normally manufactured with colored insulation, colored tapes for identification are acceptable.

NOTE

For work in an existing facility, use color coding consistent with the existing system. If the existing system has mixed color codes, use the system shown below. Notify NASA Operations & Maintenance Branch of any existing facility that does not comply with the system shown below.

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a. For AC circuits, use the following wiring color codes:

Phase	120/208 V	277/480 V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White
Ground	Green	Green
Isolated ground	Green with yellow stripe	Green with yellow stripe
Control ground	Green with orange stripe	Green with orange stripe
Instrument ground	Green with blue stripe	Green with blue stripe
Static bleed ground	Green with white stripe	Green with white stripe

b. For DC circuits, use the following wiring color codes: Positive - Red, Positive 28 volts - Red with white stripe, Negative - Black, Negative 28 volts - Black with white stripe.

5.6.2 Phasing and Phase Rotation. The standard for all phasing and phase rotation shall be A-B-C clockwise unless the existing system is otherwise.

a. Panel and Switchgear Buses: The proper sequence is A-B-C from left to right, and from top to bottom, front to back (as viewed from front, operating side) of buses, panels, switchgear, etc.

b. On three-phase delta secondary systems, the high-voltage "stinger" leg should be designated B phase and colored according to the appropriate phase-to-neutral voltage.

5.6.3 Terminal Block Labeling.

a. All terminal blocks shall be clearly labeled and separated from terminal blocks carrying significantly different and hazardous voltages. For purposes of this requirement, voltages may be grouped less than 50 volts, 50 to 250 volts, 251 to 600 volts, and over 600 volts. AC and DC circuits shall be served with different terminal blocks. Terminal blocks with terminal voltage exceeding 250 volts shall be dead front. Control circuits and power circuits shall not be served by the same terminal blocks.

b. Any equipment having terminal blocks with voltages greater than 50 volts shall be labeled adjacent to the terminal blocks with a yellow label with minimum 4-mm (5/32”) black letters stating: "CAUTION - VOLTAGES GREATER THAN 50 VOLTS MAY BE PRESENT ON TERMINALS."

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5.7 CONDUCTORS

NOTE

All conductors for general wiring shall comply with OSHA requirements.

a. Perform calculations for conductor sizing with consideration given to voltage drop, temperature derating, raceway fill derating, and future loading. Provide these calculations to the NASA Technical Monitor as requested.

b. All conductors shall have UL label and markings required by the NEC.

c. All conductors shall be copper. Aluminum is not acceptable, except for overhead primary distribution.

d. Conductor insulation shall be fire resistant.

e. Ground conductors shall be insulated (green).

f. Conductors No. 10 AWG and smaller shall be 600 V copper, type THHN/THWN. For branch circuit power and lighting circuits No. 10 AWG and smaller, splices and connections shall be made by application of spring tension connectors specifically designed and sized properly for the conductors being spliced, and insulated for 600 volts, minimum. For all circuits over 250 volts, spring tension connectors shall be double wrapped with UL listed electrical tape rated for 600 volts, minimum.

g. 600V conductors No. 8 AWG and larger shall be stranded copper, type THHN/THWN. For branch circuit power and lighting circuits No. 8 AWG and larger, splices and connections shall be made by application of crimp-type connectors specifically designed and sized properly for the conductors being spliced, and insulated for 600 volts, minimum. In areas where crimping is not possible, split lug connectors can be used. Crimp-type connectors shall be double wrapped, first with rubber tape and then with UL listed electrical tape rated for 600 volts, minimum.

h. Use No. 12 AWG minimum, 600V insulation, copper conductor for all power wiring and current transformer wiring.

i. Use No. 14 AWG, 300V stranded copper for all control wiring unless otherwise required. If the control wiring is placed in the same conduit with power wiring, 600V insulation is required. For control circuits, splices and connections may be made by the application of crimp-type connectors specifically designed and sized properly for the conductors being spliced, and insulated for the voltage rating of the conductors. Specify termination

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devices with the same conductor temperature rating. For logic level wiring and wiring from supervisory and annunciator devices to terminal blocks, smaller wire may be used provided it is adequately supported and meets the voltage and current requirements.

j. Multi-conductor cables, cable bundles, and wire pairs shall be labeled on each end with unique designators. Wires shall be labeled at each terminal strip using permanently marked heat-shrink labels only. Wire and cable labels shall indicate the device located at the opposite end, terminal block, and terminal number. All wire and cable designations, terminal block locations, and terminal block assignments shall be documented on SORD drawings.

5.8 RACEWAYS

5.8.1 General

a. Perform raceway fill calculations with consideration to all derating required by the NEC.

b. Drawings shall indicate the number of conductors in all conduit runs, wire-way sections, and cable tray sections. Provide these calculations to the NASA Technical Monitor as requested.

c. Identify conduits, wire-way sections, and cable tray sections and indicate in the drawing the corresponding conductor fill.

d. Specify a requirement in the contract specifications to label all main feeder conduits, all wire-way sections, and all cable tray sections. Labels should also indicate maximum conductor fill.

e. Test systems, data acquisition, and instrumentation cables shall not occupy the same raceway with power and other service conductors, unless approved by the NASA Technical Monitor.

f. Provide minimum of 50% spare capacity for data acquisition raceways, 100% spare capacity for control and instrumentation raceways, and 200% spare capacity for digital data transmission raceways. This spare capacity shall be in the form of spare conduits with pull strings, or spare cable tray capacity. Exceptions to the spare capacities noted above must be documented in an approved requirements document.

g. The use of Teflon tape or other sealants on conduit threads is strictly prohibited at SSC.

h. Field changes require additional calculations to verify that the maximum conductor fill will not be exceeded. Provide these calculations to the NASA Technical Monitor as requested.

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i. Provide adequate ground continuity on all conduit runs. Run a ground wire in the conduit; metallic conduit shall not be used as the ground conductor. Refer to section 5.26.

5.8.2 Exterior Raceway Systems.

a. Schedule 40 PVC conduit encased in concrete may be used for underground raceways for 13.8 kV systems.

b. Raceways for 13.8 kV service shall be 100 mm (4") for 1/0 conductors serving individual facilities, 150 mm (6") for all lines serving more than one facility, and 150 mm (6") for 500 MCM conductors.

c. The top of the concrete shall be stained red for all 13.8 kV raceways.

d. Generally, specify rigid galvanized steel conduit for installations above ground and wrapped or coated rigid galvanized steel conduit, or concrete encased schedule 40 PVC, for underground raceway carrying low-voltage systems. However, schedule 80 PVC may be used without concrete for underground low-voltage raceways if not subjected to mechanical injury.

e. Design raceways with the required separations between systems. Indicate the required dimensions on the drawing(s).

f. Provide adequate, 20 percent minimum, conduit space and spare conduits for future use in all conduit duct banks.

g. Use a minimum of 20-mm (3/4") size conduit for all exterior installations.

h. Use electrical metallic tubing (EMT) for any exterior installation only when the installation is not subject to extreme weather, mechanical damage or areas classified as hazardous.

i. Install pull strings in all conduits. Pull strings must be weather resistant (i.e., rot and mildew resistant).

j. Label conduits at both ends with feeder designation numbers.

k. Install color-coded trace tapes above all underground ductbanks and conduits, 150 mm (6") to 300 mm (12") below the finished grade. The color code shall be as follows: Power (all voltages) - Red, Communications - Orange. The trace tape shall be polyethylene, 75 mm (3") to 150 mm (6") wide, with a metallic tracer formed into the

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tape. The trace tape shall be tied to the conduit it is marking, with the metallic trace extending above ground for ease of identification.

5.8.3 Interior Raceway Systems

a. Specify rigid steel conduit if the installation is subjected to severe mechanical or chemical hazard. Non-metallic conduit may be used in concealed locations allowed by the NEC. Flexible metallic conduit and liquid-tight flexible metal conduit may be used in locations allowed by the NEC. In all other locations, the use of EMT is acceptable as allowed by the NEC.

b. Design raceways with adequate separations between systems. Indicate the required dimensions on the drawings(s). Design adequate space for future growth into the system. Use a minimum of 20-mm (3/4") conduit size except for connection to instrument devices where a 15-mm (1/2") conduit may be used.

c. Openings around electrical conduit and cable tray penetrations through fire resistance rated walls, partitions, floors, or ceilings shall be fire-stopped using UL approved materials and methods. Put typical notes in applicable drawings requiring the contractor to have the Construction Manager inspect the openings before and after sealing compounds are poured.

d. Locate conduit stub ups on drawings(s) as well as indicating dimensions from reference point(s) and between stub ups.

e. Install pull strings in all new conduits. Pull strings must be weather resistant (i.e., rot and mildew resistant).

f. Label conduits at both ends with feeder designation numbers.

g. Conduits shall not be used for supporting any other installations except as permitted by NEC.

h. Transitions between raceway systems, such as conduit to tray, conduit to wire-way, etc., shall be detailed and shown on the drawing(s). Provide adequate ground continuity per NEC for all raceway transitions.

i. Wire-way installations shall be detailed and shown on the drawing(s). Wire fill shall be in accordance with the NEC. No more than 30 current-carrying conductors shall occupy a wire-way at any point (cross-section) and the sum of the cross-section area of all the conductors at any point along the wire-way shall not exceed 20% of the cross-section area of the wire-way. Installation of receptacles on wire-ways shall be permitted only if manufacturer's design permits. Show mounting details on the drawing(s).

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j. Cable tray installation shall be detailed and shown on the drawings(s). Tray fill shall be in accordance with the NEC. Provide cable tray fill schedules in the drawing(s).

5.8.4 Test Facility Raceway Systems. All test facility raceways shall be labeled on both ends with unique designations, in accordance with the SORD system. All raceway designations and locations shall be documented on SORD drawings.

5.9 TRANSFORMERS

NOTE

All transformers shall be installed and properly marked in accordance with OSHA requirements.

5.9.1 Facility Services. Facility services shall be supplied by 13.8 kV delta - 480/277 V wye, 3-phase, non-PCB liquid-filled transformers. Up to 300 kVA may be pole mounted, 301 kVA and above shall be pad mounted outdoors. Specify 55°C/65°C rise rating with copper windings, primary and secondary surge protection, and manufactured in accordance with ANSI C57 and NEMA standards. Specify loop feed configuration, with ANSI/IEEE 386 connectors for primary connections to pad mounted transformers. Primary Basic Impulse Levels (BIL) rating shall be in accordance with ANSI C57. Specify transformers using SPECSINTACT Section 16276. Design oil containment requirements for transformers according to Factory Mutual recommendations.

5.9.2 Pole Type Transformers. Pole type distribution transformers (maximum 100 kVA) shall be single phase, non-PCB liquid-filled, conventional type, 14,400/24,900Y V primary voltage, 120/240 V or 277 V secondary voltages, with universal taps at 13,800 V, 13,200 V, 12,870 V, and 12,540 V. Transformers shall be manufactured in accordance with ANSI C57.12.20. Specify the transformers using the SPECSINTACT Section 16276. Completely Self Protected (CSP) transformers are not acceptable.

5.9.3 Dry Type Transformers. Dry type secondary distribution transformers shall be used for indoor applications only and only if a liquid filled transformer is not suitable for the specific installation. The use of outdoor type cast coil or encapsulated substation dry type transformers is prohibited at SSC. Exceptions may be considered for some applications, only with prior consultation and approval from the NASA S&MA**,** NASA Operations & Maintenance Branch and Facilities Design Branch . If approved, the transformers shall be three-phase, 60 Hertz, fan cooled, 13.8 kV - 480/277 V Delta-Wye, 80°C rise, 110 kV BIL rating. **All transformers above 75 kVA shall be manufactured with copper windings.** The transformers shall be manufactured and tested in accordance with ANSI C57, NEMA, and IEEE standards.

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5.9.4 Metering. All distribution transformer installations shall be provided with a metering section. Specify a programmable digital type multi-function (kWh and demand) meter, with pulse initiators.

5.9.5 General Purpose Transformers. For general purpose dry type transformers for low voltage distribution (15 to 500 kVA), limit the loads on the transformer to 80% maximum of its full load capacity. The transformer shall be 3-phase, 60 Hertz, 480 V to 208/120 V Delta-Wye, constructed in accordance with NEMA, ANSI, ASA, and IEEE standards. Primary and secondary windings shall be copper. Insulation shall be 220°C class. Temperature rise shall be 80°C. The transformer shall have two 2.5% taps above, and two 2.5% taps below neutral, and shall be 100% tested to meet ANSI/NEMA sound level standards. The transformer shall be UL listed.

5.9.6 Non-Linear Loads.

a. For non-linear (nonsinusoidal) loads, specify a dry-type distribution transformer specifically designed for non-linear loads such as switching mode power supplies, electronic solid state ballasts, diode and silicon controlled rectifiers, high intensity discharge lighting, variable speed drives, inverters welders, etc. Non-linear transformers shall be used when non-linear loads exceed 25% of the transformer rating. Where possible, limit the loads on the transformer to 80% (40% nonlinear load and 40% linear load) of its maximum full load capacity. The transformer shall be 3-phase, 60 Hertz, Delta-Wye, constructed in accordance with NEMA, ANSI, ASA, and IEEE standards. Primary and secondary windings shall be copper. Insulation shall be 200°C class. Temperature rise shall be 80°C. The transformer shall have two 2.5% taps above, and two 2.5% taps below neutral, and shall be 100% tested to meet ANSI/NEMA sound level standards. The minimum K rating shall be K-4 for any transformer with harmonic loads, and K-13 for transformers with linear loads totaling 25% or more of the transformer rating. The transformer shall be UL 1561 listed.

b. **A copper electrostatic shield shall be inserted between the primary and secondary windings to attenuate high frequency harmonics.** The secondary conductors shall all be individually insulated, as small in size as possible, and transposed where necessary to keep hysteresis and eddy current losses at the harmonic frequencies to an absolute minimum. The secondary neutral shall be twice the ampacity of the secondary phase conductors, and the primary winding conductor shall be of sufficient size to limit the temperature rise to its rated value even with circulating 3rd harmonic currents.

5.9.7 Clearance. Ensure sufficient clearance for access to all transformers.

5.9.8 Spare Growth Capacity. Ensure all new transformers are designed with 20% spare growth capacity. All transformers shall be provided with taps accessible on one side only.

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5.10 MOTORS

The use and procurement of motors is normally initiated by the mechanical engineer or designer. It is the responsibility of the electrical engineer or designer to review the electrical portion of the specification for the motor to ensure compliance with the standards set forth in this section.

a. Specify energy efficient motors. Motor nameplates shall contain efficiency labeling for full-load efficiency with indicated maximum and minimum expected efficiency.

b. Specify a service factor of 1.15.

c. *Specify 480V, 3-phase, 60 Hertz power input for all motors .56 kW and larger.

d. *Specify 3-phase, 60 Hertz power input for all motors .37 kW and above.

e. *Specify 120V, 208V or 240V, single phase, 60 Hertz power input for all motors less than .37 kW unless available at 3-phase 208V or 480V.

* In the case of smaller motors and/or this type of power is not readily available, consult with the NASA Technical Monitor for substitutions.

5.11 MOTOR CONTROLLERS

5.11.1 General

a. Indicating lights should be provided. They shall be color-coded and labeled to clearly identify the operational mode of the equipment or system. Indicating lights color code shall be as follows:

RED (Stop/Danger/Hazard) denotes a system or component that is energized, running, or closed.

GREEN (Go/Normal/Safe) denotes a system or component that is de-energized, stopped (not running), or open.

AMBER (Caution/Standby/Pending Trouble) denotes a fault condition.

b. Padlocking provisions shall be provided on all devices.

c. Wiring shall be Type 1B.

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5.11.2 Motor Control Centers

Generally, if there is a significant number of motors and other 480V loads, a 480V motor control center shall be provided to feed these loads.

a. Motor control centers shall be 480V 3-phase, 3-wire rated at 600 VAC.

b. The horizontal bus, vertical bus, and ground bus shall be plated copper.

c. Combination starters shall be full voltage across the line, circuit breaker type. Circuit breakers shall be 600 VAC rated. Refer to Section 5.11.3 for motor starter requirements.

d. Control voltage shall be 120 VAC. Provide control transformers for each starter.

e. Provide push-to-test indicating lights.

f. Provide a minimum of 10% spare starters and 10% spare spaces for future use.

g. Provide two N.O. and two N.C. spare auxiliary contacts for future use.

h. Motor control center shall have a UL label.

i. A housekeeping pad is not required except in areas adjacent to sources of water or any fluid leaks.

j. Provide a level work area in front of the motor control center for ease of handling breakers and draw-out equipment and to meet the NEC requirements for mounting heights of devices.

k. Motor control centers shall be front access only.

l. Specify non-automatic main breaker.

m. Provide phase loss protection.

5.11.3 Motor Starters

a. Specify circuit breaker type, across the line voltage combination starters magnetic type with solid state overload protection in each ungrounded phase, with reset, phase loss protection, momentary type start/stop buttons, and push-to-test indicating lights.

b. Starters shall be provided with a fused 120 VAC control transformer for control circuits. Specify fuse blown indicator type fuses.

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c. Provide one N.C. and one N.O. auxiliary contact for future use.

5.11.4 Manual Starter

Provide 120 VAC single-phase manual switches for starting single-phase fractional kW motors. Manual switch starters shall be provided with thermal overload protection.

5.11.5 Motor Control Schematic Wiring Diagram

Provide a schematic control diagram for all motors including single-phase motors and instrumentation. Instrumentation symbols shall be in accordance with the current joint instrument council (JIC) standards. Schematic control diagrams shall be drawn in accordance with the Facilities Drafting Manual SSTD-8070-0002-CONFIG.

5.12 DISTRIBUTION SWITCHBOARDS

a. Supply interior power requirements from a distribution switchboard that is to be located in the electrical equipment room. The distribution switchboard shall serve as the service entrance equipment.

b. Distribution switchboards used as service entrance equipment shall be specified as such to comply with the NEC and UL requirements for service entrance equipment.

c. Distribution switchboards shall be manufactured and tested in accordance with NEMA, ANSI, IEEE and UL standards. Switchboards shall be completely assembled, wired, adjusted and tested at the factory.

d. Distribution switchboards shall be UL listed.

e. Main distribution switchboards shall be 3-phase, 4-wire, 480Y/277V, rated at 600 VAC, if 50% or more of the facility load can be served at that voltage. Other distribution switchboards shall be 3-phase, 4-wire, 480Y/277V, rated at 600 VAC or 208Y/120V rated at 240 VAC.

f. Distribution switchboards shall be front accessible only and front aligned. All parts, including bus connections that require adjustment and regular maintenance, shall be accessible from the front only. Provide hinged covers/doors.

g. Limit the switchboard width to the minimum for ease of maintenance and access.

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h. All busses rated 225 amps and higher, including the phase bus, the neutral bus, and the ground bus, shall be plated copper. All other bus material shall be approved by the NASA Technical Monitor. Neutral bus shall be fully rated.

i. All circuit breakers shall be molded case type or drawout type. All circuit breakers shall be 600 VAC rated and shall have solid state trip and provision for padlocking. Handle extensions shall be provided as required.

j. A housekeeping pad is not required except in areas adjacent to sources of water and other fluid leaks.

k. Provide a level work area in front of the switchboard for ease of handling breakers and draw-out equipment and to NEC requirements for mounting heights of devices.

l. Ensure sufficient clearance for access to all switchboards.

m. Main breakers are to be used when required by the NEC.

5.13 PANELBOARDS (LIGHT AND APPLIANCE)

a. Panelboards shall be 208Y/120-V, 3-phase, 4-wires or 480Y/277V, 3-phase, 4-wires.

b. All busses rated 225 amps or higher, including the phase bus, the neutral bus, and the ground bus, shall be plated copper. All other bus material shall be approved by the NASA Technical Monitor. Neutral bus shall be fully rated.

c. Limit number of branch circuit poles to 42 maximum.

d. Circuit breakers for use on a 208Y/120V panelboard shall be 240V, AC rated, molded case type and circuit breakers for use on a 480Y/277V panelboard shall be 600V, AC rated, molded case type. Main breaker and identified feeder breakers other than breakers for lighting and receptacle loads shall have padlocking provisions.

e. Specify hinged panelboard trim front construction with breaker door hinged and secured with keyed handle, and main cover hinged on one side and secured with screws on the other.

f. Provide 20% growth capacity in each panelboard for future loads in addition to loads identified during design. Provide 50% of the growth capacity provided above for single pole breaker spaces in each panelboard in addition to loads identified during design.

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g. Locate panelboards close to the center of the load area so that branch circuits can be limited to a maximum distance of approximately 45 m (100') for 277/480-volt systems, and 25 m (80') for 120/208-volt systems.

h. Maintain and indicate on the drawing(s) all required working space clearance dimensions. Include a note on the drawing requiring that these dimensions shall be maintained at all times and a note requiring the contractor to mark on the floor the boundaries of the working clearance with striped yellow border.

i. Mount panelboards so that the distance from the floor to the handle of the highest breaker will not be more than 2 m (6').

j. Provide engraved laminated plastic nameplates on the exterior of panel-boards indicating name, voltage, phase, source, etc. Include a requirement in the contract specifications for the contractor to provide and install the nameplates in accordance with the nameplate schedule. Panelboards served by uninterrupted power supplies (UPSs) shall be clearly marked with minimum 25 mm (1") high black lettering on yellow background.

k. Provide a typed circuit directory in each panelboard. Include a requirement in the contract specifications for the contractor to provide and place a typed circuit directory inside the panel door. The circuit directory shall include the panel and circuit number of the source of power. All panelboard circuits shall be numbered so that the odd numbered circuits are on the left, and the even numbered circuits are on the right. Multipole circuits shall be numbered using all space designations that the breaker occupies.

l. Balance the loads between all phases of each panelboard, upon completion of installation or modification.

m. Panelboards shall be UL listed.

5.14 PANELBOARDS FOR INSTRUMENT, ELECTRONICS AND COMPUTER LOADS

a. Power to instrument, electronics, and computer loads shall be fed from dedicated panelboards with an isolated ground system. These panelboards shall be designated as special power panelboards (SPP).

b. Instrument power panelboards shall be 208Y/120V, 3-phase, 6-wire systems with an insulated isolated ground bus (IG) and an uninsulated equipment ground bus (EG).

c. SPP shall be UL listed.

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d. Phase bus, neutral bus, equipment ground bus, and isolated ground bus shall be plated copper if the bus rating is 225 amps or higher. All other bus material shall be approved by the NASA Technical Monitor. Neutral bus shall be fully rated.

e. Limit number of branch circuit poles to 42 maximum.

f. Circuit breakers shall be AC rated, bolt-on type. Main breaker shall have padlocking provisions.

g. Loads shall be fed from the special power panelboard through isolated ground type receptacles.

h. Isolated ground type receptacle shall be standard NEMA grade and orange in color.

i. Limit the number of isolated ground type receptacles to two per circuit.

j. Locate special power panelboards close to the center of the load area so that branch circuits can be limited to a maximum distance of approximately 45 m (150') on 277/480-volt systems and 25 m (80') on 120/208-volt systems.

k. Maintain and indicate on the drawing(s) all required working space clearance dimensions. Include a note in the drawing requiring that these dimensions shall be maintained at all times and a note requiring the contractor to mark on the floor the boundaries of the working space clearance with striped yellow border.

l. Mount panelboards so that distance from the floor to the handle of the highest breaker will not be more than 1800 mm (70").

m. Provide engraved laminated plastic nameplates on the exterior of panelboards indicating name, voltage, phase, source, etc. Panelboards served by uninterrupted power supplies (UPSs) shall be clearly marked with minimum 25 mm (1") high black lettering on yellow background.

n. Provide a typed circuit directory in each panelboard in accordance with 5.13-k.

o. Specify hinged panelboard trim front construction with breaker door hinged and secured with keyed handle, and main cover hinged on one side and secured with screws on the other.

p. Provide 20% growth capacity in each panelboard for future loads in addition to loads identified during design. Provide 50% of the growth capacity provided above for single pole breaker spaces in each panelboard for future use.

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q. Balance the loads between all phases in each panelboard.

r. Install a surge suppressor for each instrument power panel.

s. Single-phase panelboards are generally unacceptable and shall not be used unless approved by the NASA Technical Monitor.

5.15 RECEPTACLES

5.15.1 120V Receptacles

a. Specify specification grade, NEMA type 5-20R, 2-pole, 3-wire grounding, 20-amp, 125V AC UL listed duplex receptacles for 120V outlet general use. Label receptacles for voltages above 120V with the correct voltage and number of phases.

b. Provide 120V duplex receptacles for general use in all areas in accordance with NEC and as required by the user.

c. Provide 20-amp dedicated outlets and circuit(s) for custodial use in all corridors at 9-m (30') stations.

d. Design for a maximum of six duplex receptacles per 20-amp circuit.

e. Provide ground-fault circuit-interrupter (GFCI) type receptacles in kitchen areas, bathroom areas, shower areas, vending areas, and all outdoor locations, including on roofs where roof mounted equipment may require maintenance.

f. Provide GFCI receptacles for drinking water fountains.

5.15.2 208V, 3-Phase Receptacles. Provide NEMA locking type, standard configuration with grounding 250 VAC single receptacles as required by the user.

5.15.3 480V, 3-Phase Welding Receptacles. Provide NEMA locking type, standard configuration with grounding, 600 VAC welding receptacle as required by the user.

5.15.4 Special Receptacles. Special receptacles required by the customers shall be identified in the requirements document.

5.15.5 UPS. Receptacles served by uninterrupted power supplies (UPSs) shall be manufactured with orange colored body materials.

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5.16 COVER PLATES

Specify in the construction specifications and in the drawings a requirement for the contractor to attach on the cover plate of each receptacle a label indicating the panelboard and the circuit number from which the receptacle is fed.

5.17 SWITCHES

Specify heavy duty, specification grade, 20 amp, 120-277 VAC quiet switches for general use.

5.18 DISCONNECT SWITCHES

a. Provide local non-fusible safety switches or circuit breakers for all motor loads. Locate safety disconnect switch so that it is within reach of the operator at all times. For elevator loads, the disconnecting means shall be an enclosed externally operable circuit breaker capable of being locked in the open position.

b. Provide heavy-duty type, UL listed, kW rated disconnect switches. Disconnect switches shall meet NEMA specification.

c. Provide padlocking provisions for all safety switches.

d. Label all safety devices to comply with NEC and OSHA requirements. Include load being served and the source of power (panel and circuit).

5.19 EXTERIOR LIGHTING

a. Use high-pressure sodium (HPS) lighting fixtures for all general purpose exterior lighting except as specified in 5.19-g.

b. Control exterior lighting by means of photocells.

c. Lighting contactors are to be used for control of parking lot lighting only.

d. Mount light fixtures on building walls where appropriate. Locate fixture such that glare is not directed towards any guard station.

e. The type of fixtures and mounting shall be similar to existing lighting in adjacent buildings or areas (if applicable).

f. Perform lighting calculations. Refer to the SSC Lighting Standard Design for Energy Conservation (SSC 50-002) for lighting design details.

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g. Lighting for video recording shall be designed to provide the correct color temperature and intensity for the video recording equipment specified by the requirements document.

h. Provide multi-level lighting in test cells if specified by the requirements document.

i. Exterior lighting shall be fed by 277Vor 480V circuits.

5.20 INTERIOR LIGHTING

a. Perform lighting calculations. Refer to the SSC Lighting Standard Design for Energy Conservation (SSC 50-002). Higher illumination levels for any area shall be approved by the NASA Technical Monitor.

b. Switch lighting by areas or by zones.

c. Provide motion-activated lighting for normally unoccupied areas, except mechanical equipment rooms and restrooms.

d. A centralized lighting control system for energy management should be considered on new building facilities.

e. Coordinate lighting design with architectural ceiling grid design and sprinkler system, and with the user's functional needs and the type of equipment that will be used, like computers, etc.

f. Interior lighting shall be fed by 277V or 480V circuits.

g. Electronic ballast shall be less than 10% total harmonic distortion.

5.21 EMERGENCY AND EXIT LIGHTING

a. Locate emergency and exit lights in accordance with the Life Safety Code NFPA 101.

b. Refer to the SSC Lighting Standard Design for Energy Conservation (SSC 50-002) for lighting design details.

c. All new or replacement exit lights shall be green LED type.

d. Emergency lighting systems must provide a reasonable means of performing required operational tests per NFPA 101.

e. Emergency lights shall be able to perform an automatic test for not less than 30 seconds and a diagnostic routine not less than once every 30 days. Failures shall be indicated

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through a status indicator, independent from maintenance personnel. Continuous status of that test shall be held in the unit until the next test cycle.

5.22 STANDBY GENERATORS AND TRANSFER SWITCHES

a. Provide a quick disconnect on the outside of the facility for a portable generator connection when required by the customer, or when deemed prudent based upon the function performed by the facility.

b. Provide a transfer switch for all generator circuits. An automatic transfer switch is preferred for all permanent generator installations. A manual transfer switch is required for all portable generator installations. Each transfer switch shall be equipped with a maintenance bypass switch.

c. New designs shall incorporate a standby bus and wiring for critical loads in the facility.

d. For all automatic start generator installations, provide the following remote indications to the EMCS operator as a minimum: output breaker position, bypass switch/breaker position, HOA switch position, water jacket low temperature alarm, low oil pressure alarm, ATS switch position, and generator running indication.

5.23 UNINTERRUPTIBLE POWER SUPPLIES

a. The need for an Uninterruptible Power Supply (UPS), as well as the size and style (on-line or standby) of the UPS shall be justified in the requirements document prior to design.

b. UPS shall be properly sized for the expected loads and the required power delivery period. Typically, UPS units are sized to provide a minimum of 30 minutes run time at full rated load. All UPS units sized 3 kVA and larger shall incorporate three-phase power where available.

c. All permanently installed UPS installations shall incorporate maintenance bypass switching and safety measures.

d. All permanently installed UPS systems serving loads in areas protected by sprinkler systems shall have shunt trip provisions connected to the facility fire alarm control panel to completely deenergize the loads in the sprinkled area or a disconnect means at the principle exit(s). The shunt trip or disconnects shall disconnect all AC & DC power sources from the UPS system. Exceptions to this requirement per NEC 1999 are UPS systems serving integrated electrical systems in which orderly shutdown is necessary to prevent equipment damage or personnel injury due to sudden loss of electrical power, and UPS systems less than 750 voltamperes.

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e. All UPS battery systems shall be tested for acceptance at the manufacturer's facility, or upon initial installation at a specific discharge rate and for a duration relating to the purchase specification requirements. In the absence of purchase specification requirements, acceptance tests shall be made to validate the manufacturer's rating.

f. For critical UPS installations requiring continuous remote monitoring (EMCS), interface provisions shall be provided in the equipment procurement. Preferred information for remote monitoring are output breaker position, bypass switch/breaker position, power failure, DC bus voltage, low battery alarm, ATS switch position, and UPS on line indication.

g. As a minimum all UPSs shall have a power failure (on battery reserve) and a low battery alarm/indicator. Alarm silence capability is recommended.

h. Provide isolation transformers and/or filters to ensure that harmonics produced by the UPS do not feed back into the power supply.

i. The battery cabinet or rack on all UPS units sized 3 kVA or larger shall provide at least 20 cm (8”) of clearance from the battery posts to the level above it for easy access to posts and straps during maintenance.

j. Where battery cells are contained in a battery cabinet, the cabinet must provide adequate space for maintenance personnel. Sufficient space is needed to allow maintenance personnel access to each individual cell for voltage and inter-cell resistance measurements without having shutdown or disassembly of the battery string.

5.24 TELECOMMUNICATIONS

a. Provide telecommunications closets in new facilities. For work in existing facilities, extend telecommunications services from existing telecommunications closets. Provide lighting with a dedicated switch for the telecommunications closet.

b. Install two 100-mm (4”) PVC conduits from the telecommunications closet to the nearest telecommunications manhole.

c. Install a 1200-mm (48”) by 2400-mm (96”) by 20-mm (3/4”) fire retardant plywood telecommunications backboard in the telecommunications closet. Provide two dedicated 120 VAC circuits for convenience power at the telecommunications backboard. Provide a telecommunications ground plate at the telecommunications backboard. Bond ground plate to the building single point ground electrode by means of a No. 6 AWG stranded copper ground conductor.

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d. Provide a minimum of one outlet box or tele-power pole for telecommunications outlet(s) in each office or work station. Route a 20-mm (3/4") minimum conduit with a pull string back to the telecommunications backboard.

5.25 FIRE ALARMS

Fire detection for facilities shall conform to NFPA 72, National Fire Alarm Code and the NASA Standard 8719.11, Safety Standard for Fire Protection.

5.26 GROUNDING

a. Design the grounding system in accordance with the National Electrical Code (NEC) and as specified in this section.

b. Limit the resistance of the power grounding system to 5 ohms. For 2500 kVA substations and larger, the resistance of the grounding system shall be limited to 1 ohm maximum.

c. Install a ground grid underneath the substation or a grounding counterpoise around the substation, supplemented by electrolytic ground rod(s). Bond the substation grounding system to the building grounding electrode system at the service entrance by means of a #4/0 ground conductor.

d. Install a 25-mm (1") by 1-m (3') by 6-mm (1/4") copper grounding bar at the service entrance for single-point grounding, with #4/0 ground conductor to the nearest ground rod on the building grounding electrode system.

e. Install an insulated (green) ground conductor in all conduits and other raceway systems for equipment grounding. The raceway system shall not be used as a grounding conductor.

f. A minimum size ground conductor of No. 12 AWG or larger shall be used for all power circuits.

g. Provide a grounding system diagram.

h. Show all equipment grounding bond connections in the grounding plan drawing or in the power plan drawing(s), by symbol or by note.

i. Use exothermic connections for all underground and inaccessible bonding connections.

j. Provide ground test point wells.

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k. Isolated, dedicated grounding systems will be provided for controls, instrumentation, power and static bleeds where required. Control, instrumentation, power and static grounds shall be bonded together with removable jumpers at one point in each facility.

l. Ground all metallic items in the electrical systems.

m. Use 19-mm (3/4") by 3-m (10') copper ground rods, or equivalent. Grounding to underground pipes is not acceptable.

n. Ground resistance tests shall use the fall-of-potential method. Test not less than 48 hours after last rainfall. Single rod electrodes shall not exceed 25 ohms. The resistance to true ground for instrumentation grounding systems shall be 0.5 ohm maximum. The resistance to true ground for control grounding systems shall be 5 ohms maximum. The minimum distance between ground grids shall be 10 meters (33').

o. Additional grounding considerations are required on test facilities to prevent the emission of electromagnetic interference (EMI). These additional grounding requirements shall be clearly identified in the requirements document by the owner.

p. Equipment racks in test facilities shall have provisions to be connected to any of the ground grids. Equipment racks shall be electrically isolated from each other.

q. Raised flooring shall be connected to the facility power ground at one location, and shall be electrically isolated from all other grounds.

5.27 LIGHTNING PROTECTION

a. A lightning protection system is required for all structures over 16 m (50') in height, or any facility with high value equipment, as determined by NASA ESD Design Branch.

b. Extend the lightning protection to any building addition if the addition is not within the lightning protection zone coverage of the existing facility.

c. Design and install the lightning protection system in accordance with NFPA 780 and Lightning Protection Institute, Inc. (LPI) Installation Standard Section, Lightning Protection Specification (LPI-175), and Army Safety Manual AMCR385-100 for facilities in which explosives are used or stored, and as specified in this section. For engine test facilities, design and install the lightning protection system in accordance with NSTS 07636, in addition to the above standards.

d. Install a lightning protection perimeter grounding system**,** #4/0 minimum conductor size, at a distance of 600 mm (24") from the foundation wall to a maximum of 1000 mm (40") and at a depth 600 mm (24") below grade. Bond the counterpoise to the building

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grounding electrode system at the service entrance and at each corner structure steel column. Bond all grounded elements in a test area (e.g., tanks, MCC, building, test stand, flare stacks, pipes) to the ground grid.

e. Specify UL and LPI approved materials. Copper is strongly suggested; but aluminum may be used if material to be installed on existing surfaces is made of aluminum or if copper is not suitable for the environment. All down conductors must be made of copper unless the environment prevents the use. Bond all grounded elements in a test area (e.g., tanks, MCC, building, test stand, flare stacks, pipes) to the ground grid. All materials used must be approved by the NASA Technical Monitor.

f. Route down conductors along surface of exterior wall. Through-the-roof connectors are not acceptable.

g. For new facilities, specify a requirement for material manufacturers to furnish shop drawings showing lightning protection system, installation details, and list of materials. The contractor shall provide LPI certification.

h. For existing facilities, inspection of the lightning protection system will be the responsibility of the maintenance contractor. The contractor shall be required to correct all deficiencies promptly. Once the system has passed inspection, the maintenance contractor will arrange for an LPI certification.

5.28 METERING

a. All facilities shall be provided with a combination kWh/Demand meter on the secondary side of each distribution transformer.

b. Metering equipment shall be suitable for outdoor installation, and shall normally be mounted on the exterior of the low voltage compartment of pad mount transformers. Provide a 25-mm (1") conduit hub in the meter base into the low-voltage compartment for meter connections. Provide conduit knockouts in the meter base for future connection of EMCS conduits and wiring.

c. Metering shall consist of three bushing mounted current transformers, kWh meter with 15-minute pulse interval, meter base and all interconnecting wiring.

d. Current transformers shall be placed around low voltage bushings and shall be equal to General Electric type JAB-O. Meter shall contain output terminals for external kW and kWh monitoring connected to K, Y, and Z output terminals.

e. Meter shall be 277-volt, 4-wire wye, 2-1/2 elements, Class 20, Form 6S, 13 Terminal, Sangamo Model #SL5DS with pulse initiator, or equivalent.

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f. Meter shall be mounted in a 20-amp, transformer rated, 13-terminal meter socket, ringless, with 10-pole test switches.

g. Meter socket shall be a Milbank Type S7449-XL or approved equal.

h. Test switches shall be Superior Switchboard and Devices Type MP713-FMS-2975, or approved equal.

5.29 SEWAGE LIFT STATIONS

All electrical work, including pump motors and controls, that is installed in sewage lift stations shall meet the requirements of Article 500 of the NEC for Class 1, Division 1 or 2, Group D locations.

5.30 DC POWER SYSTEMS

DC power systems provide an independent source of power for control systems. The DC supply shall be sufficiently sized for the total connected load. DC supply batteries shall be sized to provide a minimum of 30 minutes run time at full rated load of the DC supply. Additional time may be required to adequately secure the facility in the event of a commercial power loss.

6.0 RECORDS AND FORMS

Records and forms identified in this document shall be dispositioned and maintained in accordance with the requirements of SSC SSLP-1440-0001. Records dispositioned as Quality Records are identified on the SSC Records Index electronic database on the SSC Home Page. All forms are assumed to be the latest edition unless otherwise specified and may be obtained from the SSC Electronic Forms repository on the SSC Home Page or from the NASA SSC Forms Management Officer.

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APPENDIX A

ACRONYMS AND ABBREVIATIONS

NOTE

Acronyms for Equipment Designator Codes are listed in Section 5.5.1.

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACSR	Aluminum Conductor, Steel Reinforced
AFF	Above Finished Floor
AMCR	Army Material Command Regulation
amp	ampere
ANSI	American National Standards Institute
ASTM	American Society for Testing and Material
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
BIL	Basic Impulse Levels
°C	Degrees Centigrade
CEF	Central Engineering Files
CFR	Code of Federal Regulations
CMMS	Computerized Maintenance Management System
CSP	Completely Self Protected
DC	Direct Current
EG	Equipment Ground
EMCS	Energy Management and Control System
EMI	Electromagnetic Interference
EMT	Electrical Metallic Tubing
EPR	Ethylene-Propylene Rubber
ERD	Environmental Resources Document
ESD	Engineering Services Division (NASA)
ES&H	Environmental, Safety and Health
FM	Factory Mutual
FOSC	Facility Operating Services Contractor
FRB	Facility Review Board

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GFCI	Ground-Fault Circuit-Interrupter
HOA	Hand-Off-Automatic
HPS	High Pressure Sodium
IEEE	Institute of Electrical and Electronic Engineers
IES	Illumination Engineering Handbook
IG	Isolated Ground
IPCEA	Insulated Power Cable Engineers Association
JIC	Joint Instrument Council
K	Harmonics designator
k	kilo
kV	kilovolt
kVA	kilovoltampere
kW	kilowatt
kWh	kilowatt hour
LED	Light Emitting Diode
LPI	Lightning Protection Institute
m	meter
MCC	Motor Control Center
MCM	Thousand Circular Mils
MCOV	Maximum Continuous Operating Voltage
MG	Motors and Generators
mm	millimeter
MV	megavolt
MVA	megavoltampere
N.C.	Normally Closed
N.O.	Normally Open
NASA	National Aeronautics and Space Administration
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPG	NASA Procedures and Guidelines
NSTS	National Space Transportation System
O&M	Operating and Maintenance
OSHA	Occupational Safety and Health Act

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PCB	Polychlorinated Biphenyl
PM	Project Manager
PTD	Propulsion Test Directorate
PVC	Polyvinyl Chloride
RF	Radio Frequency
S&MA	Safety and Mission Assurance
SF_6	Sulfur Hexafluoride
SI	International System Metric units of measure
SKM	name of manufacturer of “Power Tools for Windows”
SORD	Sitewide Operation Repair Document
SPECSINTACT	Specifications Kept Intact
SPG	SSC Procedures and Guidelines
SPP	Special Power Panelboard
SSC	Stennis Space Center
SSLP	Stennis System Level Procedure
SSTD	Stennis Standard
STD	Standard
THHN	Heat Resistant Thermoplastic
THWN	Moisture and Heat Resistant Thermoplastic
U.S.C.	United States Code
UL	Underwriter's Laboratory
UPS	Uninterrupted Power Supply
V	volt
VAC	Volts Alternating Current
Y	connection type (3-phase)

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ATTACHMENT 8

SSC FACILITY MSS DESIGN ENGINEERING CHECKLIST

(Where conflicts arise between the SSC Facility MSS Design Engineering Checklist and the Unified Facilities Criteria (UFC) documents, the UFC requirements shall take precedence)

MISSISSIPPI SPACE SERVICES

DESIGN ENGINEERING CHECKLIST

PROJECT TITLE: _____

NASA PROJECT NO: _____ SWR NO: _____

The following engineering design criteria have been established by NASA Project Management Division. Please verify that the above referenced project has been designed in compliance with these criteria by indicating "Yes" or "N/A" for each of the items below. Any items marked "NO" must be documented in the "Variances" section at the end of this checklist. All variances must indicate the NASA Technical Monitor(s) who approved the deviation and justification for non-compliance.

GENERAL CONSIDERATIONS

YES	NO	N/A	
☐	☐	☐	1. Roof fall protection: provide roof fall protection for new construction or existing if it involves equipment located within six feet of roof edge.
☐	☐	☐	2. Grounding: Ground all exterior steel structures.

ARCHITECTURAL CONSIDERATIONS

YES	NO	N/A	
☐	☐	☐	1. Roof drain covers are cast iron.
☐	☐	☐	2. Doors are installed with door stops.
☐	☐	☐	3. Door locksets are Arrow, Best or Falcon with interchangeable cores.
☐	☐	☐	4. Acoustical ceiling tiles are 610mm x 610mm.

CIVIL ENGINEERING CONSIDERATIONS

YES	NO	N/A	
☐	☐	☐	1. Ready mix concrete for flatwork contains 0.9 kg of synthetic fibers per cubic meter.
☐	☐	☐	2. Sidewalks are detailed with thickened edges.
☐	☐	☐	3. All underground utility locations are identified, accurately located and have been verified by Scott Fandal.
☐	☐	☐	4. New sanitary sewage collection systems are tied into the main lagoon. Impact assessment of new loadings has been coordinated with FSD personnel.

ELECTRICAL ENGINEERING CONSIDERATIONS

YES	NO	N/A	
☐	☐	☐	1. Outside utility services comply with Section 5.2 of SSC Standard 50-008.
☐	☐	☐	2. Interior building services comply with Section 5.3 of SSC Standard 50-008.
☐	☐	☐	3. Equipment designations comply with Section 5.4 of SSC Standard 50-008.
☐	☐	☐	4. Wiring color codes comply with Section 5.5 of SSC Standard 50-008.
☐	☐	☐	5. Conductors comply with Section 5.6 of SSC Standard 50-008.
☐	☐	☐	6. Raceways comply with Section 5.7 of SSC Standard 50-008.
☐	☐	☐	7. Transformers comply with Section 5.8 of SSC Standard 50-008.
☐	☐	☐	8. Distribution switchboards comply with Section 5.9 of SSC Standard 50-008.
☐	☐	☐	9. Motor Control Centers comply with Section 5.10 of SSC Standard 50-008.
☐	☐	☐	10. Panelboards for Lighting and Appliances comply with Section 5.11 of SSC Standard 50-008.
☐	☐	☐	11. Panelboards for Instruments, Electronics and Computer Loads comply with Section 5.12 of SSC Standard 50-008.
☐	☐	☐	12. Receptacles comply with Section 5.13 of SSC Standard 50-008.
☐	☐	☐	13. Cover plates comply with Section 5.14 of SSC Standard 50-008.
☐	☐	☐	14. Switches comply with Section 5.15 of SSC Standard 50-008.
☐	☐	☐	15. Disconnect switches comply with Section 5.16 of SSC Standard 50-008.
☐	☐	☐	16. Motors comply with Section 5.17 of SSC Standard 50-008.
☐	☐	☐	17. Motor starters comply with Section 5.18 of SSC Standard 50-008.
☐	☐	☐	18. Manual starters comply with Section 5.19 of SSC Standard 50-008.
☐	☐	☐	19. Motor control schematic wiring diagrams comply with Section 5.20 of SSC Standard 50-008.
☐	☐	☐	20. Exterior lighting complies with Section 5.21 of SSC Standard 50-008.
☐	☐	☐	21. Interior lighting complies with Section 5.22 of SSC Standard 50-008.
☐	☐	☐	22. Emergency and Exit lighting complies with Section 5.23 of SSC Standard 50-008.
☐	☐	☐	23. Standby generators and transfer switches comply with Section 5.24 of SSC Standard 50-008.
☐	☐	☐	24. Uninterruptible power supplies comply with Section 5.25 of SSC Standard 50-008.
☐	☐	☐	25. Telecommunications comply with Section 5.26 of SSC Standard 50-008.
☐	☐	☐	26. Fire alarms comply with Section 5.27 of SSC Standard 50-008.
☐	☐	☐	27. Grounding system complies with Section 5.28 of SSC Standard 50-008.
☐	☐	☐	28. Lightning protection system complies with Section 5.29 of SSC Standard 50-008.
☐	☐	☐	29. Metering complies with Section 5.30 of SSC Standard 50-008.

MECHANICAL ENGINEERING CONSIDERATIONS

YES	NO	N/A	
☐	☐	☐	1. Automatic reset phase loss protection, Time Mark model 158 or approved equal is provided for all 3-phase mechanical equipment.
☐	☐	☐	2. All equipment disconnects are specified as non-fused.
☐	☐	☐	3. Each branch duct has a quadrant handle located on the side of the duct.
☐	☐	☐	4. Flex duct runs do not exceed two meters. Use Aluminum Triple-Lock by Flexmaster.
☐	☐	☐	5. Flexible connections are specified as Elgen, Silent Duct SDH-4-100 or approved equal at the inlet and outlet duct connections for all mechanical equipment.
☐	☐	☐	6. Hinged access doors are provided for access to filters, fans, coils, heaters, fire dampers, smoke dampers, automatic control dampers and any other equipment which requires periodic maintenance and/or inspection. Access doors are double insulated where condensation may develop.
☐	☐	☐	7. Air handling equipment filters are 25 mm thick, pleated and 30% efficient and filter bank frames are one of the following standard sizes: 406mm X 508mm or 635mm, 508mm X 508mm or 635 mm, or 635mm X 635mm.
☐	☐	☐	8. All equipment, ductwork, piping, hangers, supports and any other surfaces subject to corrosion are painted, galvanized or otherwise protected.
☐	☐	☐	9. Boiler and hot water heater relief valves are piped to safe areas near the floor where operation will avoid personal injury and damages to equipment and structure.
☐	☐	☐	10. Chiller vents and relief valves are piped outdoors using copper tubing or other approved materials.
☐	☐	☐	11. Automatic, EMCS compatible chemical injection systems are installed on all condenser water systems. Provide Make & Model Number of Components.
☐	☐	☐	12. Chemical pot feeds are provided for chemical treatment of all closed loop-piping systems such as chilled water and hot water heating loops.
☐	☐	☐	13. Specifications require that all piping systems shall be flushed and cleaned prior to operating equipment such as chillers and boilers. This includes circulation of pumps to filter debris through strainers, removal and cleaning of strainers as necessary until strainers remain clean.
☐	☐	☐	14. The specifications clearly indicate who is responsible for operation and maintenance of equipment during any beneficial occupancy period. This requirement has been discussed with and approved by the technical monitor.
☐	☐	☐	15. Piping connections to boilers and equipment are Victolic, flanged or union fittings (depends on connection size). Welded connections are not acceptable.
☐	☐	☐	16. All piping connections 50mm and larger have vibration isolator fittings when connected to pumps, chillers and other equipment subject to vibrations.

MECHANICAL ENGINEERING CONSIDERATIONS (Cont.)

YES	NO	N/A	
☐	☐	☐	17. All wall and slab penetrations are sleeved and exterior wall penetrations are sealed to prevent entry of moisture, rodents and insects.
☐	☐	☐	18. All piping runs parallel or perpendicular to the building structure.
☐	☐	☐	19. Specifications require that grouped runs of piping and refrigerant tubing shall be installed in a neat, parallel configuration with adequate space for proper support, identification and access.
☐	☐	☐	20. Magnetic identification tape is specified for installation over buried non-metallic piping.
☐	☐	☐	21. Project specifications incorporate site standards for piping colors and identification for type of service and direction of flow.
☐	☐	☐	22. Refrigerant tubing supports are specified as Cush-a-clamp or approved equal and spaced to prevent vibration and deflection of tubing.
☐	☐	☐	23. Refrigerant tubing is specified to be insulated with closed-cell flexible rubber tubing such as Armaflex or equal. Indoor insulation is 12mm thick and outdoor insulation is 25mm thick with approved weather/U.V. protection. Specifications require seams to be minimized but sealed and facing downward where necessary.
☐	☐	☐	24. Cooling towers have fiberglass or stainless steel basins, hinged access door, gear box driven fan, access ladder to top, with door if required, covered distribution deck, and perforated pan distributors. All components in contact with water are stainless steel or coated with fiberglass reinforced plastic and fasteners are stainless steel. Condenser water temperature control is maintained by fan cycling, either 2-speed fan or VFD on fan motors. A three-way diverter valve controls bypass to maintain condenser water above 18.3C and control by diverting bypass is not activated until the fan has cycled off.
☐	☐	☐	25. All ductwork is externally insulated.
☐	☐	☐	26. Outdoor ductwork has foamglass type insulation with sealed joints, anchor pins and approved adhesive. Insulation is covered with aluminum jacket or fiberglass mesh and weatherproof mastic and will be installed to prevent water ponding. All penetrations are located on the side and are sealed to prevent moisture entry.
☐	☐	☐	27. Roof exhaust fans are specified as direct driven.
☐	☐	☐	28. Refrigerant systems do not use CFC refrigerants.
☐	☐	☐	29. Roof top units are not utilized.
☐	☐	☐	30. A Standard Air Handling Unit Schedule is shown on the drawings and includes: Sensible Load, Latent Load, Entering Air Temp., Exiting Air Temp., Air Flow Rate, Static Pressure, Filters, Power Requirements, Motor KW, Accessories, Make and Model.
☐	☐	☐	31. A Standard Air Conditioner Unit Schedule is shown on the drawings and includes: Sensible Load, Latent Load, Condenser Temp at Rating, Efficiency Rating, Static Pressure, Power Requirements, Air Flow Rate, Filters, Accessories, Make and Model of Evaporator and Condenser.

MECHANICAL ENGINEERING CONSIDERATIONS (Cont.)

YES NO N/A

☐ ☐ ☐ 32. Chilled & Heating Water Piping/Insulation:
   a. Indoor - Steel pipe w/fiberglass insulation, ASJ vapor barrier
   b. Outdoor Above Grade - Steel pipe, preinsulated (polyurethane) UV resistant fiberglass jacketing (this replaces the foamglass with aluminum jacketing).
   c. Below Grade ChW -
      1) Significant Runs - HDPE pipe, preinsulated (polyurethane) HDPE jacketing.
      2) Short Runs - Steel pipe, preinsulated (polyurethane) PVC jacketing, or fiberglass jacketing.
   d. Below Grade Low Temp HW - Steel pipe, preinsulated (polyurethane) PVC jacketing, or fiberlgass jacketing.
   e. Transitions from below grade to above grade as follows--Joint should be approx. 1 ft. below grade with an insulation field joint. UV protected fiberglass jacket must start below grade. Where HDPE is used, it must transition to a steel carrier pipe below grade, and a bolted flange will be required. Use a field insulation kit over the flange, or install a valve box over the flange.

☐ ☐ ☐ 33. A Standard Diffuser Schedule is shown on the drawings and includes: Design Airflow, Throw Pattern, Throw, Type, Finish, Accessories, Make and Model.

☐ ☐ ☐ 34. A Standard Outside Air Intake Schedule is shown on the drawings and includes: Free Area, Bird Screen, Type, Finish (Aluminum is preferred), Make and Model.

☐ ☐ ☐ 35. All Mechanical Equipment Rooms with heat generating equipment, such as boilers, transformers, large motors, etc., have exhaust systems and cross flow ventilation.

☐ ☐ ☐ 36. Mechanical and Electrical rooms are located along outside walls and provided with double doors.

☐ ☐ ☐ 37. Mechanical Equipment Room floor drains are tied into the sanitary sewer system and have automatic trap primers where evaporation is not otherwise prevented.

☐ ☐ ☐ 38. The blowdown for all mechanical systems are piped to the sanitary sewer system.

☐ ☐ ☐ 39. The specifications contain the following notation:
Unless specifically stated otherwise, all materials, equipment, tools and labor shall be provided by the contractor, as required to provide a complete and operational system. All work shall be performed using standard work practices to provide quality construction. all equipment shall be of modern design.

☐ ☐ ☐ 40. All condensate pans are configured to provide positive drainage. Large AHUs are specified to have stainless steel drain pans. Condensate piping is specified to be insulated.

MECHANICAL ENGINEERING CONSIDERATIONS (Cont.)

YES	NO	N/A	
☐	☐	☐	41. All major mechanical equipment such as chillers and boilers have EMCS resident controls. All systems supporting critical/mission sensitive areas (Test Area, Cray, Telecommunication and VAX Support Systems) have EMCS visibility as a minimum.
☐	☐	☐	42. All electric motors for mechanical equipment are high efficiency. Motors used in outdoor or high moisture exposure conditions are specified as TEFC.
☐	☐	☐	43. Strainers are specified ahead of each heat exchanger and control valve.
☐	☐	☐	44. AHUs have internally isolated fan mounts.
☐	☐	☐	45. Specifications indicate that all strainers shall be installed with blowdown valves.
☐	☐	☐	46. The specifications require the contractor to repair or replace equipment pads when existing pads are utilized for new equipment.
☐	☐	☐	47. Temporary power source and quick disconnect fittings have been provided to facilitate utilization of temporary chiller equipment.
☐	☐	☐	48. Water treatment for open and closed systems has been addressed.
☐	☐	☐	49. Functional test shall be performed on all reused EMCS sensors.
☐	☐	☐	50. Sequence of Construction has been provided.
☐	☐	☐	51. Temporary Heating and/or Cooling has been addressed.
☐	☐	☐	52. Chilled Water pumps shall be insulated with Armaflex type insulation.
☐	☐	☐	53. A standard Control Valve Schedule is shown on the drawings and includes: Valve size, Flow rate, Line size, Pressure drop, Cv, and Make & Model number.
☐	☐	☐	54. Refrigerant recovery has been addressed.
☐	☐	☐	55. Roof fall protection: provide roof fall protection for new construction or existing if it involves equipment located within six feet of roof edge. See Study 6314-04-004.

VARIANCES

DISCIPLINE	ITEM NO	TECH MONITOR	JUSTIFICATION

I have reviewed the Lessons Learned Database and determined that any prior discrepancies are not repeated in this project.

Prepared By: _____ Date _____

Civil Engineer: _____ Date _____

Electrical Engineer: _____ Date _____

Mechanical Engineer: _____ Date _____

ATTACHMENT 9

ROOM FINISH SCHEDULE

Riverine and Combatant Craft Operations Facility
Stennis Space Center, MS

Finish Schedule

Area or Space	Walls C3010 (Note 3)	Floor C3020	Wall Base C302008 (Note 1)	Ceiling C3030 (Note 3)	Cabinetry	Notes
OPERATIONS BUILDING						
First Floor						
Armory	EP	CONC	RB	PS/MPI		**(Note 5)**
CSS	P	CPTT-1	RB	ACT		
Cages	EP	CONC	RB	PS/MPI		**(Note 5)**
Female Head	PT	PT	PT	GWB		
Male Head	PT	PT	PT	GWB		
Female Shower	PT	PT	PT	GWB		
Male Shower	PT	PT	PT	GWB		
Janitor	EP	PT	PT	PS		**(Note 5)**
Main Electrical Room	P	CONC	RB	PS		**(Note 5)**
Mechanical Room	P	CONC	RB	PS		**(Note 5)**
Entrance Facility (TelComm Room)	P	QVT	RB	PS		**(Note 2) (Note 5)**
Corridors	IRWT/EP	QVT	RB	ACT		
Entry	IRWT/EP	QVT	RB	GWB		Provide recessed mats
Interior Stair	IRWT/EP	QVT/RT	RB	PS/MPI		**(Note 5)**
Second Floor						
Riverine Task Unit Office	P	CPTT-1	RB	ACT		
Riverine Task Unit Commander Office	P	CPTT-2	RB	ACT		
Mission Briefing Room(s) for 24	P	CPTT-2	RB	ACT		
Squadron Interoperability Task Unit Office	P	CPTT-1	RB	ACT		
Squadron Interoperability Task Unit Commander Office	P	CPTT-2	RB	ACT		
COMM Room	P	CPTT-1	RB	ACT		
River OPS Control Watch Station	P	CPTT-1	RB	ACT	**(Note 4)**	
Female Head	PT	PT	PT	GWB		
Male Head	PT	PT	PT	GWB		
Janitor	EP	PT	PT	PS		**(Note 5)**
Electrical Room	P	CONC	RB	PS		**(Note 5)**
Mechanical Room	P	CONC	RB	PS		**(Note 5)**
TelComm Room	P	QVT	RB	PS		**(Note 5)**
Corridors	IRWT/EP	0	RB	ACT		
Interior Stair	IRWT/EP	QVT/RT	RB	PS/MPI		**(Note 5)**

Riverine and Combatant Craft Operations Facility
Stennis Space Center, MS
Finish Schedule

Area or Space	Walls C3010 (Note 3)	Floor C3020	Wall Base C302008 (Note 1)	Ceiling C3030 (Note 3)	Cabinetry	Notes
Combatant Craft Building (s)						
Boat Maintenance Building						
Boat Spaces	EP/MPI	CONC	RB	PS/MPI		**(Note 5)**
Maintenance Space	EP/MPI	CONC	RB	PS/MPI		**(Note 5)**
Boat Storage Building						
Boat Spaces	EP/MPI	CONC	RB	PS/MPI		**(Note 5)**

Legend

ACT	Acoustical Ceiling Tile
CONC	Sealed Concrete
CPTT - 1	Carpet Tile Type 1
CPTT - 2	Carpet Tile Type 2
EP	Epoxy Paint
GWB	Gypsum Wall Board
IRWT	Impact Resistant Wall Treatment
MPI	Master Painters Institiute (MPI) System EXT 5.1D-G5
P	Paint
PS	Painted Structure
PT	Porcelain Tile
QVT	Quartz Vinyl Tile
RB	Rubber Base
RT	Rubber Stair Treads

Notes

1. Provide RB at all GWB walls
2. Includes Entrance Facility, Telecommunications Rooms, and other Server/LAN Rooms.
3. Paint all structural steel columns, bracing, and other structural members unless indicated otherwise.
4. Provide desk-high countertop along windows and base cabinets, wall cabinets and countertop at Coffee Mess.
5. "Painted Structure" includes all vertical and horizontal structural members occuring within this space.

ATTACHMENT 10

WASH RACK FACILITY

Drawings

Specifications

Topographic Survey

ATTACHMENT 10

WASH RACK FACILITY

Drawings

SBT-22 WASHRACK FACILITY
STENNIS SPACE CENTER, MS
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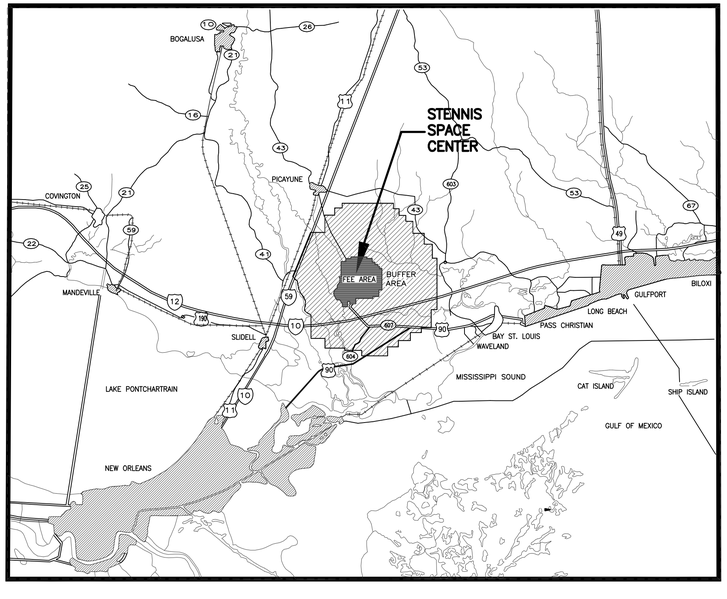
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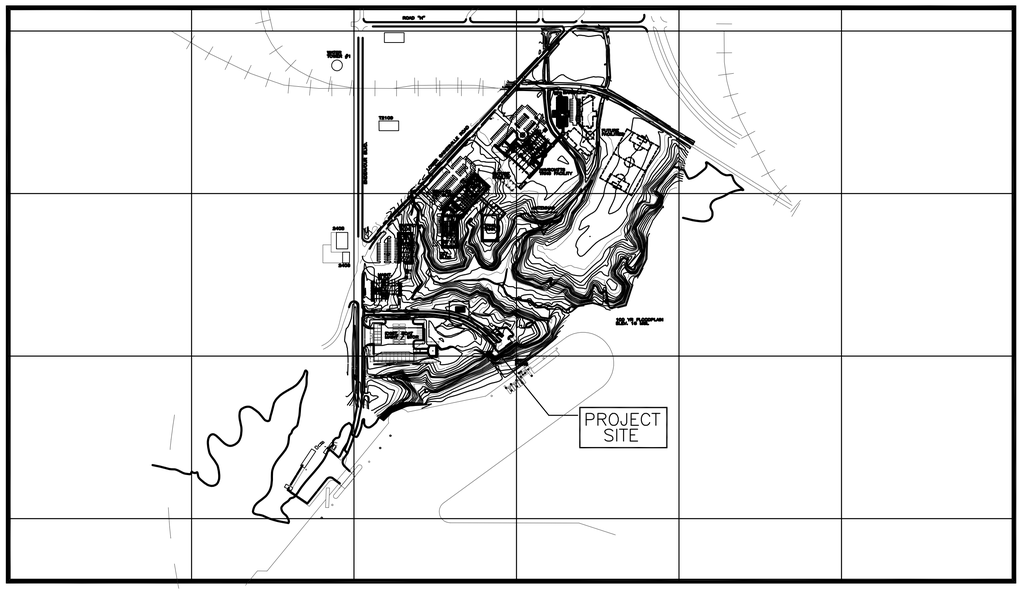
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VICINITY MAP



PROJECT SITE MAP



JH&H ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST. JACKSON, MS 39202
601-948-4601 601-355-6200 (F)

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

DSGN BAGLEY DR AE CHK BAGLEY
SUPV Ch ENGR
SUBMITTED BY (NAVY MEMBER-TITLE) DATE 06/24/05
TECHNICAL BRANCH
FPE

STENNIS SPACE CENTER, MS
SBT-22 WASHRACK FACILITY
TITLE SHEET
DATE
APPROVED
FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

REGISTERED ARCHITECT
Paul J. Bagley
2069
JACKSON, MS
STATE OF MISSISSIPPI
06/24/05

RECORD DRAWING DATE	05/06/05
CODE I.D. NO.	80091
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SPEC. NO.	
CONSTRN. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET	OF

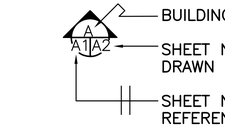
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ABBREVIATED SYMBOLS

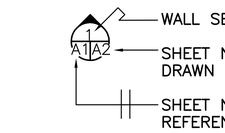
∠	ANGLE
℄	CENTERLINE
⊏	CHANNEL
⊥	PERPENDICULAR
ℙ	PLATE
⌀	ROUND

ABBREVIATIONS

ABV	ABOVE
AFF	ABOVE FINISH FLOOR
AFS	ABOVE FINISH SLAB
ACC	ACCESS
ACFL	ACCESS FLOOR
ACP	ACCORDIAN PARTITION
AC	ACOUSTICAL
ACPL	ACOUSTICAL PLASTER
ACT	ACOUSTICAL TILE
ADD	ADDENDUM
ADH	ADHESIVE
ADJ	ADJUSTABLE
AGG	AGGREGATE
A/C	AIR CONDITIONING
ALT	ALTERNATE
ALUM	ALUMINUM
ANC	ANCHOR, ANCHORAGE
AB	ANCHOR BOLT
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECT (URAL)
AD	AREA DRAIN
ASB	ASBESTOS
ASPH	ASPHALT
AUTO	AUTOMATIC
BKR	BACKER
BSMT	BASEMENT
BRG	BEARING
BPL	BEARING PLATE
BM	BEAM
BIT	BITUMINOUS
BLK	BLOCK
BLKG	BLOCKING
BD	BOARD
BW	BOTH WAYS
BOT	BOTTOM
BRK	BRICK
BRZ	BRONZE
BLDG	BUILDING
BU	BUILT UP
BBD	BULLETIN BOARD
BOS	BOTTOM OF STEEL
CAB	CABINET
CPT	CARPET
CSMT	CASEMENT
CI	CAST IRON
CIP	CAST–IN–PLACE
CST	CAST STONE
CB	CATCH BASIN
CLK	CALK(ING) CAULK(ING)
CLG	CEILING
CEM	CEMENT
CMBD	CEMENTITIOUS BOARD
CT	CERAMIC TILE
CBD	CHALK BOARD
CHAM	CHAMFER
CIR	CIRCLE
CLR	CLEAR(ANCE)
CLS	CLOSURE
COL	COLUMN
COMB	COMBINATION
COMPO	COMPOSITION,COMPOSITE
COMP	COMPRESS(ED)(ION)
CONC	CONCRETE
CMU	CONCRETE MASONRY UNIT
CONST	CONSTRUCTION
CONT	CONTINUOUS,CONTINUE
CONTR	CONTRACT,CONTRACTOR
CJ	CONTROL JOINT
CPR	COPPER
CG	CORNER GUARD
CORUG	CORRUGATED
CORR	CORRIDOR
CTR	COUNTER
CFL	COUNTERFLASHING
CNTRSK	COUNTERSINK
CSE	COURSE(S)
CF	CUBIC FOOT
CY	CUBIC YARD
CO	CLEAN OUT
CLO	CLOSET
DN	DOWN
DPR	DAMPER
DP	DAMP–PROOFING
DEM	DEMOLISH,DEMOLITION
DMT	DEMOUNTABLE
DET	DETAIL
DIAG	DIAGONAL
DIA	DIAMETER
DIM	DIMENSION
DISP	DISPENSER
DIV	DIVISION
DR	DOOR
DA	DOUBLE ACTING
DH	DOUBLE HUNG
DS	DOWNSPOUT
D	DRAIN
DT	DRAIN TILE
DRWG	DRAWING
DF	DRINKING FOUNTAIN
DBL	DOUBLE
EA	EACH
EW	EACH WAY
E	EAST
ELEC	ELECTRIC(AL)
EDF	ELEC. DRINKING FNT
ELEV	ELEVATION
EMER	EMERGENCY
EP	EPOXY PAINT
EQ	EQUAL
EQUIP	EQUIPMENT
EST	ESTIMATE
EXC	EXCAVATE
EXH	EXHAUST
EXIST	EXISTING
EB	EXPANSION BOLT
EJ	EXPANSION JOINT
EXP	EXPOSED
EXT	EXTERIOR
E.I.S.	EXTERIOR INSULATION SYSTEM
FB	FACE BRICK
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FAS	FASTEN, FASTENER
FND	FEMININE NAPKIN DISP.
FIN	FINISH (ED)
FBRK	FIRE BRICK
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CAB.
FHS	FIRE HOSE STATION
FPL	FIREPLACE
FP	FIREPROOF
FRT	FIRE–RETARDANT
FLG	FLASHING
FLR	FLOORING
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FLOR	FLOURESCENT
FTG	FOOTING
FNT	FOUNTAIN
FR	FRAME (D),(ING)
FHB	FREEZEPROOF HOSE BIB
FT	FOOT
GA	GAGE, GUAGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACT(OR)
GL	GLASS,GLAZING,GLAZED
GLB	GLASS BLOCK
GOVT	GOVERNMENT
GB	GRAB BAR
GD	GRADE, GRADING
GVL	GRAVEL
GT	GROUT
GYP	GYPSUM
GYP BD	GYPSUM BOARD
GWB	GYPSUM WALL BOARD
HCP	HANDICAP(PED)
HDW	HARDWARE
HDR	HEADER
HTG	HEATING
HVAC	HTG,VENTILATING,A/C
HD	HEAVY DUTY
HGT	HEIGHT
HC	HOLLOW CORE
HM	HOLLOW METAL
HOR	HORIZONTAL
HB	HOSE BIB
HWH	HOT WATER HEATER
HR	HOUR
HYD	HYDRANT
INCIN	INCINERATOR
ID	INSIDE DIAMETER
INSUL	INSULATE(D),(ION)
INT	INTERIOR
INV	INVERT
JC	JANITOR'S CLOSET
JT	JOINT
JF	JOINT FILLER
JST	JOIST
KPL	KICKPLATE
KIT	KITCHEN
KO	KNOCKOUT
LBL	LABEL
LAB	LABORATORY
LAD	LADDER
LB	LAG BOLT
LAM	LAMINATE(D)
LAT	LAY IN ACOUSTICAL TREATMENT
LAV	LAVATORY
LH	LEFT HAND
L	LENTH
LT	LIGHT
LP	LIGHTPROOF
LWC	LIGHTWEIGHT CONC
LN	LINE
LTL	LINTEL
LL	LIVE LOAD
LVR	LOUVER
LF	LINEAR FEET
MH	MANHOLE
MFGR	MANUFACTURE (R)
MRBL	MARBLE
MAS	MASONRY
MO	MASONRY OPENING
MAX	MAXIMUM
MECH	MECHANIC (AL)
MC	MEDICINE CABINET
MBR	MEMBER
MMB	MEMBRANE
MTL	METAL
MT	METAL THRESHOLD
MWK	MILLWORK
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MLD	MOLDING, MOULDING
MOV	MOVABLE
MULL	MULLION
NAT	NATURAL
NRC	NOISE REDUCTION COEFFICIENT
NOM	NOMINAL
NMT	NONMETALIC
N	NORTH
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO	NUMBER
OBS	OBSCURE
OC	ON CENTERS
OFF	OFFICE
OPNG	OPENING
OPP	OPPOSITE
OD	OUTSIDE DIAMETER
OA	OVERALL
OH	OVERHEAD
OS	OUTSIDE
.	.
.	.
PT	PAINT (ED)
PR	PAIR
PNL	PANEL
PTD	PAPER TOWEL DISPENSER
PTR	PAPER TOWEL RECEPTOR
PAR	PARALLEL
PKG	PARKING
PBD	PARTICLE BOARD
PTN	PARTITION
PV	PAVE(D),(ING)
PVMT	PAVEMENT
PERF	PERFORATE(D)
PLAS	PLASTER
PLAM	PLASTIC LAMINATE
PL	PLATE
PG	PLATE GLASS
PLYWD	PLYWOOD
PNT	POINT
PVC	POLYVINYL CHLORIDE
PSF	POUNDS/SQUARE FOOT
PSI	POUNDS/SQUARE INCH
PCC	PRECAST CONCRETE
PFB	PREFABRICATE (D)
PFN	PREFINISHED
PREP	PREPARATION
PL	PROPERTY LINE
QT	QUARRY TILE
QTR	QUARTER
REQD	REQUIRED
RAD	RADIUS
RL	RAIL (ING)
RND	ROUND
REF	REFERENCE
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCE (D),(ING)
RCP	REINF CONCRETE PIPE
RES	RESILIENT
RET	RETURN
RA	RETURN AIR
REV	REVISION(S), REVISED
RH	RIGHT HAND
ROW	RIGHT OF WAY
RBR	RUBBER
RVT	RIVET
RD	ROOF DRAIN
RFD	ROOF DECK
RH	ROOF HATCH
RF	ROOFING
RM	ROOM
RO	ROUGH OPENING
RB	RUBBER BASE
REC	RECESS (ED)
SFGL	SAFETY GLASS
SND	SANITARY NAPKIN DISPOSAL
SCH	SCHEDULE
SCN	SCREEN
SLNT	SEALANT
STG	SEATING
SEC	SECTION
SS	SERVICE SINK
SHTH	SHEATHING
SHT	SHEET
SV	SHEET VINYL
SH	SHELF,SHELVING
SMF	SEAMLESS FLOOR
SIM	SIMILAR
SKL	SKYLIGHT
SC	SOLID CORE
SCW	SOLID CORE WOOD
SAP	SOUND ABSORPTION PNL
SP	SOUNDPROOF
S	SOUTH
SPCR	SPACER
SPL	SPECIAL
SPEC	SPECIFICATION(S)
SQ	SQUARE
ST	STAIN
SSTL	STAINLESS STEEL
STD	STANDARD
STA	STATION
STL	STEEL
STOR	STORAGE
SD	STORM DRAIN
STC	STUCCO
STR	STRUCTURAL
SUS	SUSPENDED
SYN	SYNTHETIC
SEL	SEALER
TLT	TOILET
TBD	TACKBOARD
TECH	TECHNICAL
TEL	TELEPHONE
TV	TELEVISION
TEMP	TEMPORARY
THK	THICK (NESS)
TH	THRESHOLD
TPD	TOILET PAPER DISP
TPH	TOILET PAPER HOLDER
TG	TONGUE AND GROOVE
T&B	TOP AND BOTTOM
TOS	TOP OF STEEL
TB	TOWEL BAR
TR	TRANSOM
T	TREAD
TYP	TYPICAL
TOB	TOP OF BEAM
UC	UNDERCUT
UNF	UNFINISHED
UNGL	UNGLAZED
UR	URINAL
VAL	VALLEY
VWC	VINYL WALL COVER
VB	VAPOR BARRIER
VNR	VENEER
VTR	VENT THRU ROOF
VERT	VERTICAL
VT	VINYL TILE
VCT	VINYL COMPO TILE
WSCT	WAINSCOT
WR	WASTE RECEPTOR
WC	WATER CLOSET
WP	WATERPROOFING
WWM	WELDED WIRE MESH
W	WEST
WDT	WIDTH, WIDE
WDW	WINDOW
WD	WOOD
WB	WOOD BASE
WI	WROUGHT IRON
W/	WITH
YP	YELLOW PINE
ZN	ZONE



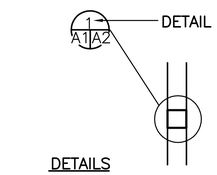
BUILDING SECTIONS



WALL SECTIONS

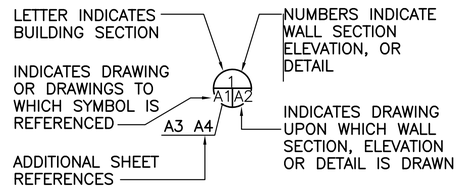


ELEVATIONS



DETAILS

REFERENCE SYMBOLS



KEY TO TITLE SYMBOLS


EARTH


COMPACT FILL

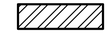

POROUS FILL

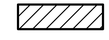

CONCRETE

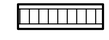

BRICK


CMU


STONE OR PRECAST STONE


METAL STUD WALL

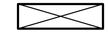

INSULATED METAL WALL PNL. (PLAN)

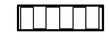

INSULATED METAL WALL PNL. (SEC)


WOOD STUD WALL


FINISH WOOD


PLYWOOD


WOOD BLOCKING


LOOSE OR BATT INSULATION

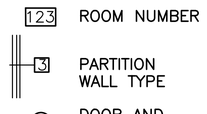

TERRAZZO

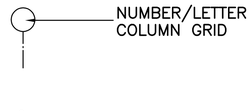

PLASTER

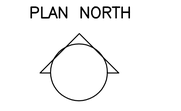

MARBLE


RIGID INSULATION


BLANKET INSUL. (FACED OR UNFACED)







SYMBOLS

JH&H ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST. JACKSON, MS 39202
601-948-4601 601-355-6200 (F)
DSGN BAGLEY DR AE CHK BAGLEY
SUPV Dft ENGR
SUBMITTED BY (NAME/INITIALS) 06/24/05 DATE
TECHNICAL BRANCH
PE

Rev.	Description	Prep By	Date	Apprvd.
	DRAWING REVISIONS			

STENNIS SPACE CENTER, MS

SBT–22 WASHRACK FACILITY

TITLE SHEET

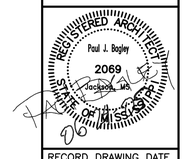
DATE

ERD FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command Southern Division Charleston, South Carolina



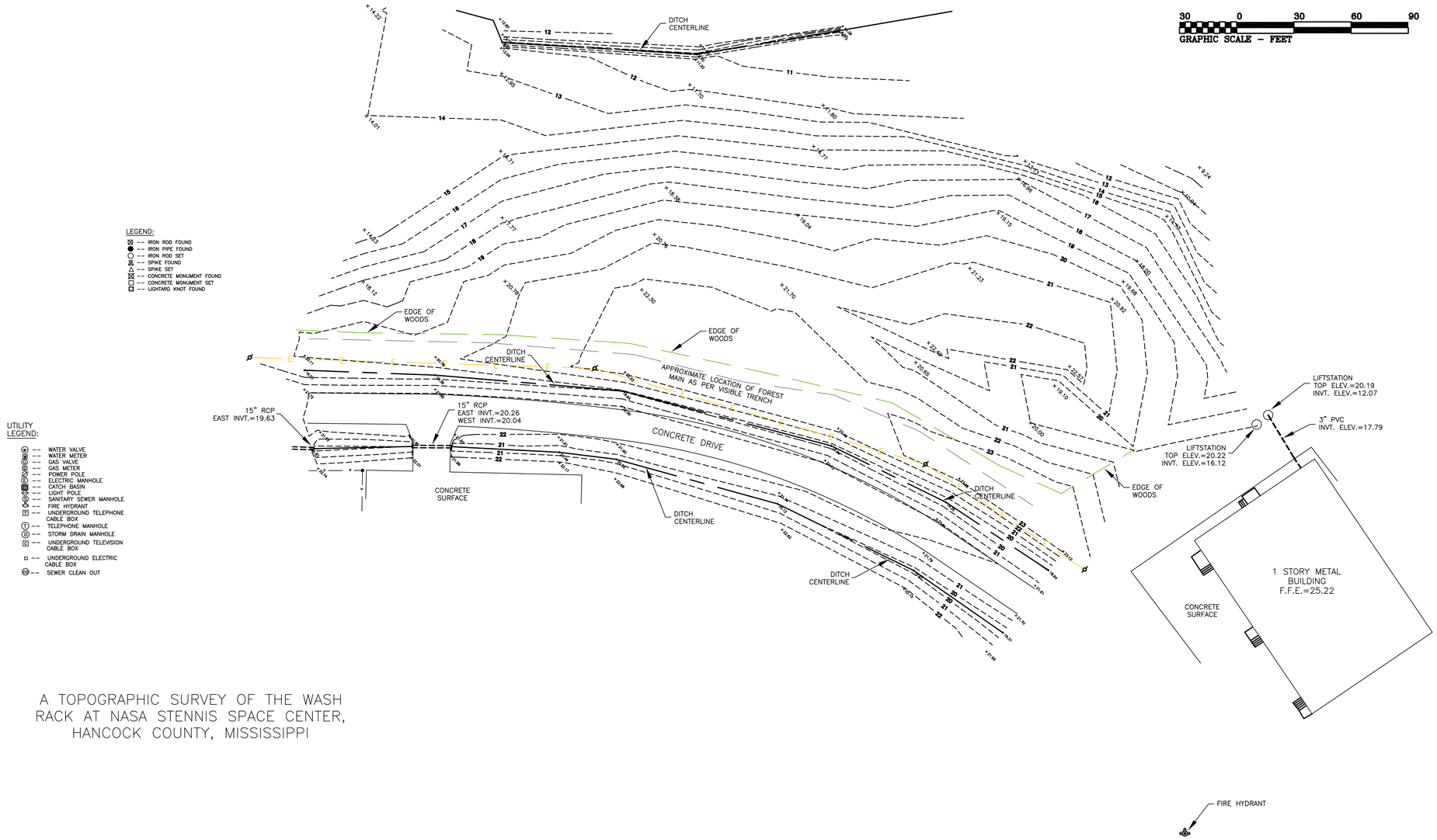


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PROFESSIONAL LAND SURVEYING

13061 HIGHWAY 67, SUITE A
BILOXI, MISSISSIPPI 39532
PHONE: 228-396-3212
FAX: 228-396-0099



NORTH

30 0 30 60 90
GRAPHIC SCALE – FEET

LEGEND:
- ⊠ -- IRON ROD FOUND
- ● -- IRON PIPE FOUND
- ○ -- IRON ROD SET
- ⊗ -- SPIKE FOUND
- ▷ -- SPIKE SET
- ⊠ -- CONCRETE MONUMENT FOUND
- □ -- CONCRETE MONUMENT SET
- ◘ -- LIGHTARD KNOT FOUND

UTILITY LEGEND:
- -- WATER VALVE
- -- WATER METER
- -- GAS VALVE
- -- GAS METER
- -- POWER POLE
- -- ELECTRIC MANHOLE
- -- CATCH BASIN
- -- LIGHT POLE
- -- SANITARY SEWER MANHOLE
- -- FIRE HYDRANT
- -- UNDERGROUND TELEPHONE CABLE BOX
- -- TELEPHONE MANHOLE
- -- STORM DRAIN MANHOLE
- -- UNDERGROUND TELEVISION CABLE BOX
- -- UNDERGROUND ELECTRIC CABLE BOX
- -- SEWER CLEAN OUT

A TOPOGRAPHIC SURVEY OF THE WASH RACK AT NASA STENNIS SPACE CENTER, HANCOCK COUNTY, MISSISSIPPI

THIS IS TO CERTIFY THAT I HAVE MADE A SURVEY OF THE PROPERTY SHOWN HEREON AND THAT ALL DIMENSIONS AND OTHER DATA SHOWN ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

CLIFFORD A. CROSBY, P.L.S. DATE

JH&H ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST
JACKSON, MS 39202
601-948-4601
601-355-6200 (F)
DR McGRATH CHK CHAPMAN
CH ENGR
SUPV McGRATH DSGN
SUBMITTED BY (FIRM MEMBER--TITLE): DATE 6-24-05
TECHNICAL BRANCH
FPE

DRAWING REVISIONS

Rev.	Description	Prep. By	Date	Apprvd.

NCBC
GULFPORT, MISSISSIPPI

TOPOGRAPHIC SURVEY AT THE WASH RACK

EXISTING TOPOGRAPHIC SURVEY

APPROVED DATE

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

EFD FOR COMMANDER, NAVFAC

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SPEC. NO.
CONSTRN. CONTR. NO.
NAVFAC DRAWING NO.
SHEET 9 OF 23

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CLEARING LIMITS

AREA TO BE CLEARED

APPROXIMATE LOCATION OF FORCE MAIN AS PER VISIBLE TRENCH

15" RCP
EAST INVT.=19.63

15" RCP
EAST INVT.=20.26
WEST INVT.=20.04

CONCRETE DRIVE

CONCRETE SURFACE

15' WIDE FOR SANITARY SEWER

LIFTSTATION
TOP ELEV.=20.19
INVT. ELEV.=12.07

3" PVC
INVT. ELEV.=17.79

LIFTSTATION
TOP ELEV.=20.22
INVT. ELEV.=16.12

1 STORY METAL BUILDING
F.F.E.=25.22

CONCRETE SURFACE

NORTH

20 0 20 40 60

LEGEND:

- ⊗ -- IRON ROD FOUND
- ● -- IRON PIPE FOUND
- ○ -- IRON ROD SET
- ⊠ -- SPIKE FOUND
- △ -- SPIKE SET
- ⊠ -- CONCRETE MONUMENT FOUND
- □ -- CONCRETE MONUMENT SET
- ⊡ -- LIGHTARD KNOT FOUND

UTILITY LEGEND:

- Ⓦ -- WATER VALVE
- Ⓦ -- WATER METER
- Ⓖ -- GAS VALVE
- Ⓖ -- GAS METER
- ∅ -- POWER POLE
- Ⓔ -- ELECTRIC MANHOLE
- ▦ -- CATCH BASIN
- ⊕ -- LIGHT POLE
- Ⓢ -- SANITARY SEWER MANHOLE
- ⊕ -- FIRE HYDRANT
- Ⓣ -- UNDERGROUND TELEPHONE CABLE BOX
- Ⓣ -- TELEPHONE MANHOLE
- Ⓓ -- STORM DRAIN MANHOLE
- Ⓒ -- UNDERGROUND TELEVISION CABLE BOX
- □ -- UNDERGROUND ELECTRIC CABLE BOX
- ⓒⓞ -- SEWER CLEAN OUT

EXISTING SITE AND CLEARING PLAN

SCALE: 1" = 20'

JH&H JOB: 04103

SE *04035

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745 N. STATE ST.
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601-948-4601
601-355-6200 (F)

DSGN McGRATH DR. CHAPMAN CHK. McGRATH
SUPV CH ENGR AMMONS
SUBMITTED BY (FIRM MEMBER-TITLE): DATE 6-24-05
TECHNICAL BRANCH
FPE

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STENNIS SPACE CENTER, MISSISSIPPI
STENNIS SPACE CENTER TENNIS SPACE CENTER
SBT-22 WASHRACK FACILITY
EXISTING SITE AND CLEARING PLAN
EFD FOR COMMANDER, NAVFAC

APPROVED DATE

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

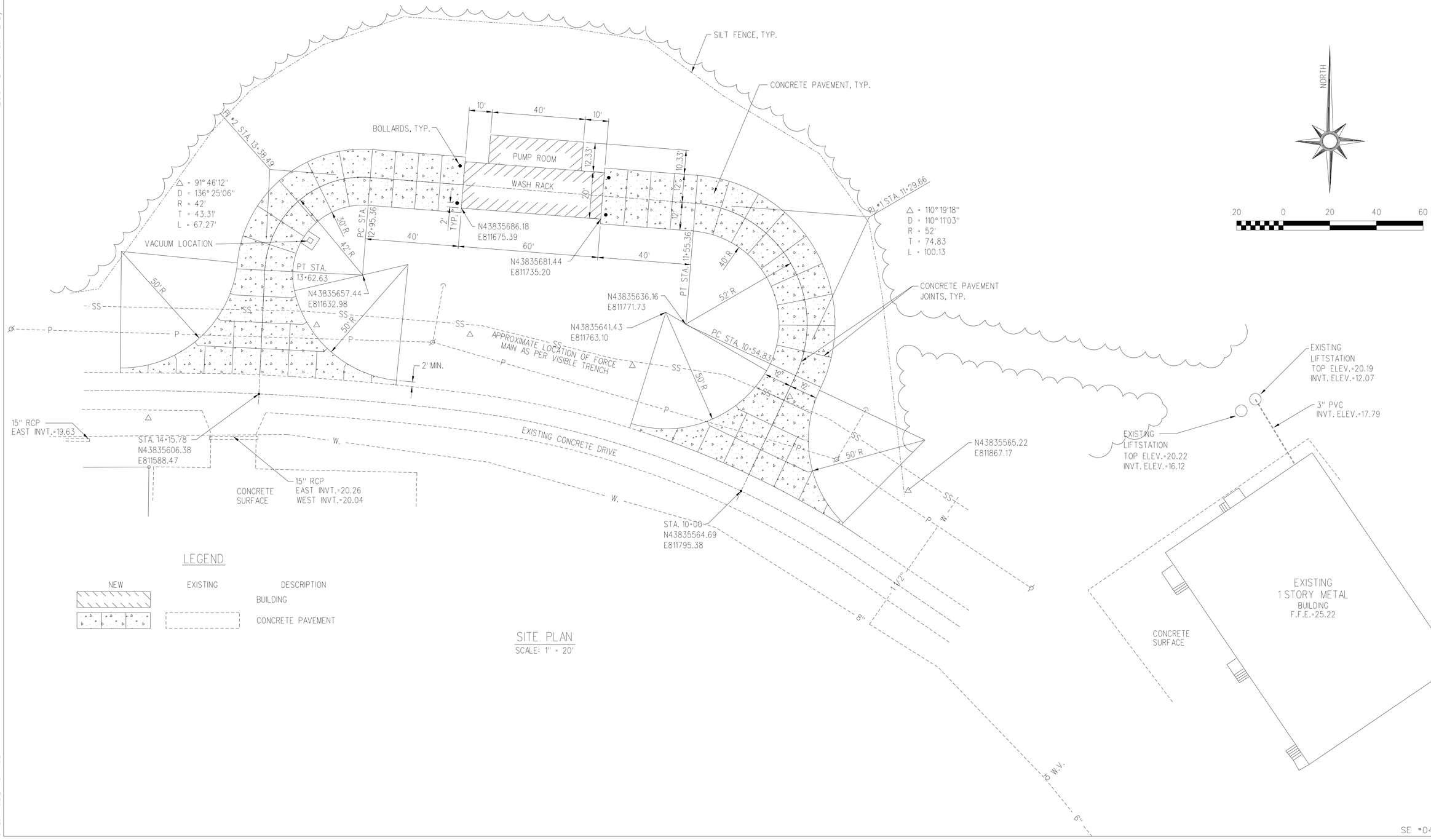
ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
STATE OF MISSISSIPPI
6-24-05

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LEGEND

NEW	EXISTING	DESCRIPTION
		BUILDING
		CONCRETE PAVEMENT

SITE PLAN

SCALE: 1" = 20'

JH&H JOB: 04103

SE *04035

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745 N. STATE ST.
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601-355-6200 (F)

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SUPV CH ENGR AMMONS
SUBMITTED BY (FIRM MEMBER-TITLE): DATE 6-24-05
TECHNICAL BRANCH
FPE

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Rev.	Description	Prep. By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

SBT-22 WASHRACK FACILITY

SITE PLAN

DATE EFD FOR COMMANDER, NAVFAC

STENNIS SPACE CENTER APPROVED

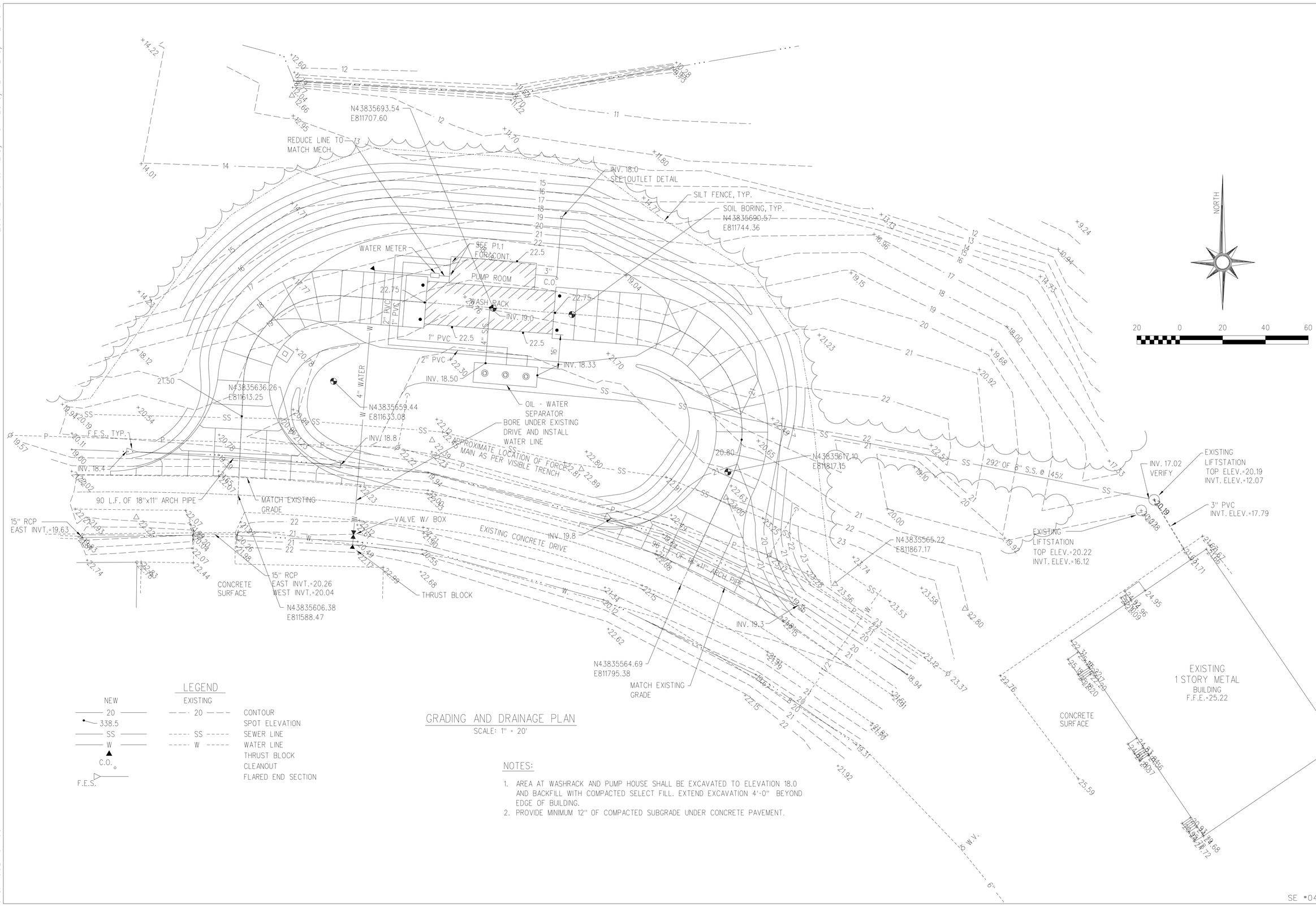
Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
6-24-05
STATE OF MISSISSIPPI

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LEGEND

NEW	EXISTING	
20	20	CONTOUR
338.5		SPOT ELEVATION
SS	SS	SEWER LINE
W	W	WATER LINE
C.O.		THRUST BLOCK
		CLEANOUT
F.E.S.		FLARED END SECTION

GRADING AND DRAINAGE PLAN

SCALE: 1" = 20'

NOTES:

1. AREA AT WASHRACK AND PUMP HOUSE SHALL BE EXCAVATED TO ELEVATION 18.0 AND BACKFILL WITH COMPACTED SELECT FILL. EXTEND EXCAVATION 4'-0" BEYOND EDGE OF BUILDING.
2. PROVIDE MINIMUM 12" OF COMPACTED SUBGRADE UNDER CONCRETE PAVEMENT.

JH&H JOB: 04103

SE *04035

JH&H ARCHITECTS INTERIORS
745 N. SAINT ST.
JACKSON, MS 39202
601-948-4601
601-355-6200 (F)

DESIGN: McGRATH DR: CHAPMAN CHK: McGRATH
SUPV: CH ENGR: AMMONS
SUBMITTED BY (FIRM MEMBER-TITLE):
TECHNICAL BRANCH
DATE: 6-24-05
FPE

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STENNIS SPACE CENTER, MISSISSIPPI

SBT-22 WASHRACK FACILITY

GRADING AND DRAINAGE PLAN

EFD FOR COMMANDER, NAVFAC

STENNIS SPACE CENTER — DATE — APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

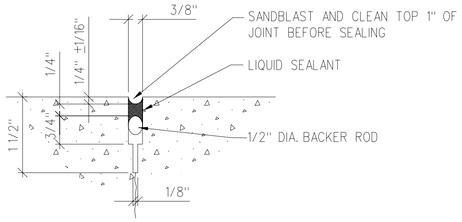
ROBERT KENNETH McGRATH — REGISTERED PROFESSIONAL ENGINEER — 6430 — STATE OF MISSISSIPPI — 6-24-05

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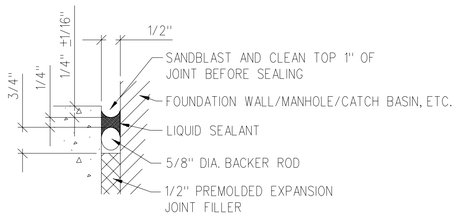
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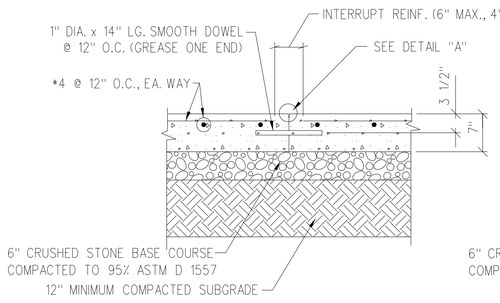


DETAIL "A"

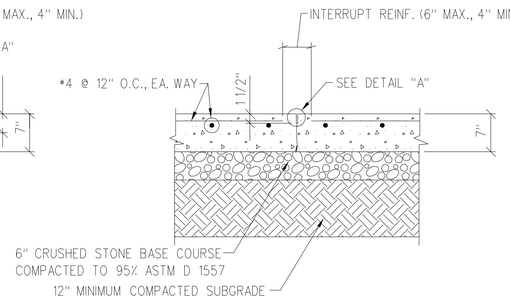
JOINT SHALL BE "TOOLED" OR SAWED WITH A "SOFF CUT SAW" WITHIN 2 HOURS OF PLACEMENT



ISOLATION JOINT



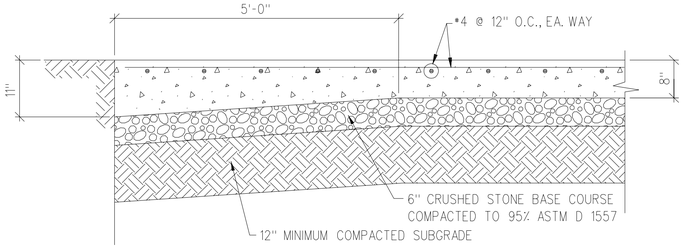
CONSTRUCTION JOINT



CONTROL JOINT

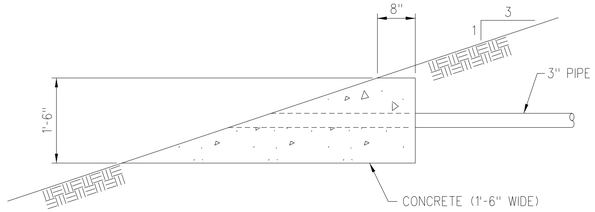
CONCRETE PAVEMENT JOINT DETAILS

CONTRACTOR SHALL USE CONSTRUCTION JOINT AT END OF POUR. CONTRACTOR MAY USE CONSTRUCTION JOINT OR CONTROL JOINT WHERE CONCRETE JOINTS ARE CALLED FOR ON THE PLANS.



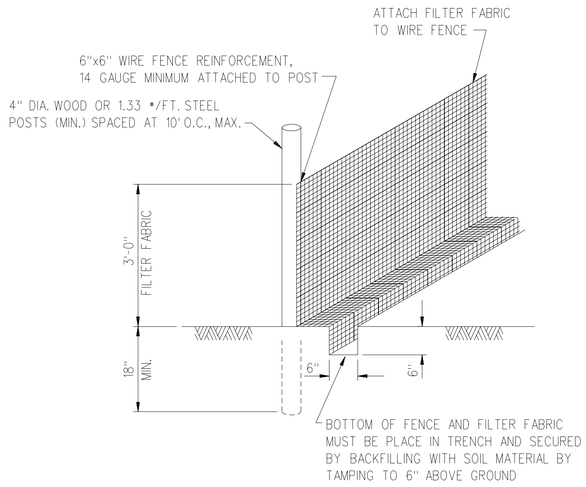
TYPICAL EXTERIOR EDGE OF PAVEMENT DETAIL

NO SCALE



TYPICAL OUTLET DETAIL

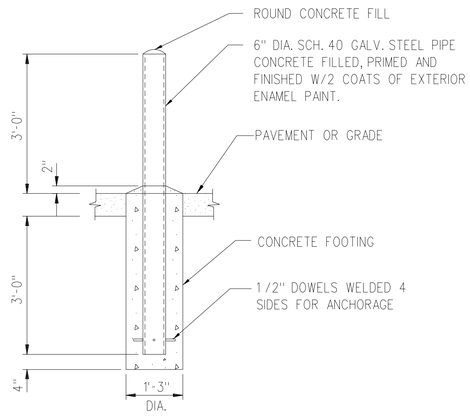
NO SCALE



SILT FENCE DETAIL

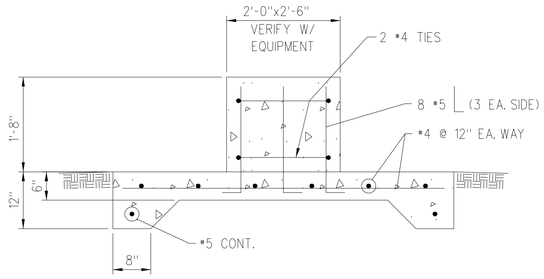
NO SCALE

NOTES:
1. SILT FENCE SHOULD BE INSPECTED AFTER EACH RAINFALL AND SEDIMENT DEPOSITS MUST BE REMOVED WHEN THEY REACH 1/4 HEIGHT OF FENCE.
2. REMOVE WHEN GRASS IS ESTABLISHED.



BOLLARD DETAIL

NO SCALE



VACUUM SLAB DETAIL

NO SCALE

JH&H JOB: 04103

SE #04035

JH&H ARCHITECTS INTERIORS PLANNERS
745 N. STATE ST.
JACKSON, MS 39202
601-948-4601
FAX: 601-355-6200 (F)

DSGN	McGRATH	DR	CHAPMAN
SUPV		CH ENGR	McGRATH
SUBMITTED BY (FIRM MEMBER-TITLE):			DATE
TECHNICAL BRANCH			6-24-05
			PPE

DRAWING REVISIONS

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STENNIS SPACE CENTER, MISSISSIPPI

SBT-22 WASHRACK FACILITY

SITE DETAILS

DATE

EFD, FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
6-24-05
STATE OF MISSISSIPPI

RECORD DRAWING DATE

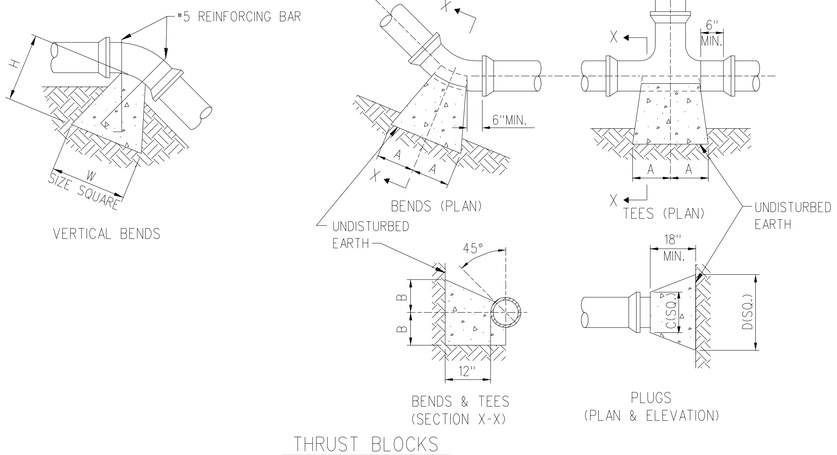
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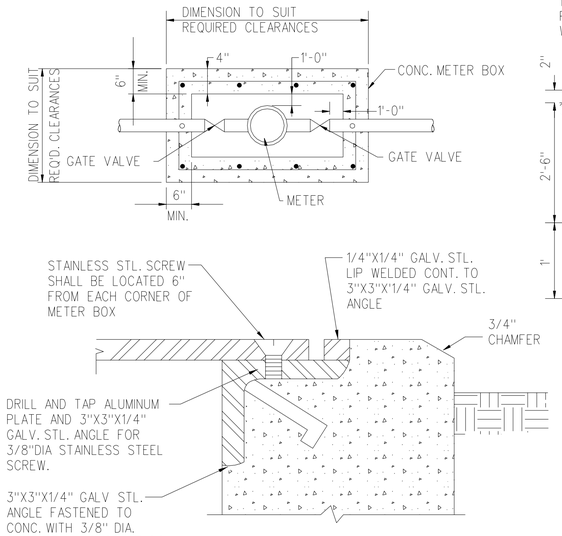
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SIZE	1/8 BENDS		1/16 BENDS		1/32 BENDS	
	W	H	W	H	W	H
4" - 6"	42"	42"	36"	36"	30"	30"
8"	54"	54"	42"	42"	36"	36"
10"	60"	60"	48"	48"	42"	42"
12"	66"	66"	54"	54"	48"	48"

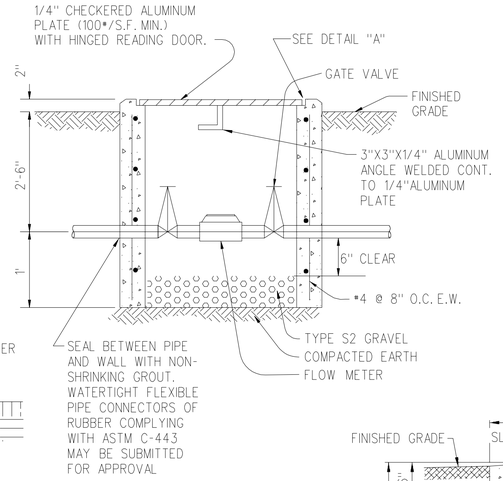
SIZE	1/4 BENDS		1/8 BENDS		1/16 BENDS		TEES		PLUGS	
	A	B	A	B	A	B	A	B	C	D
6" & BELOW	16"	10"	9"	10"	6"	8"	10"	12"	10"	21"
8"	22"	13"	12"	13"	8"	10"	13"	16"	12"	29"
10"	26"	18"	16"	15"	10"	12"	15"	20"	14"	36"
12"	30"	20"	20"	17"	11"	14"	17"	24"	16"	40"



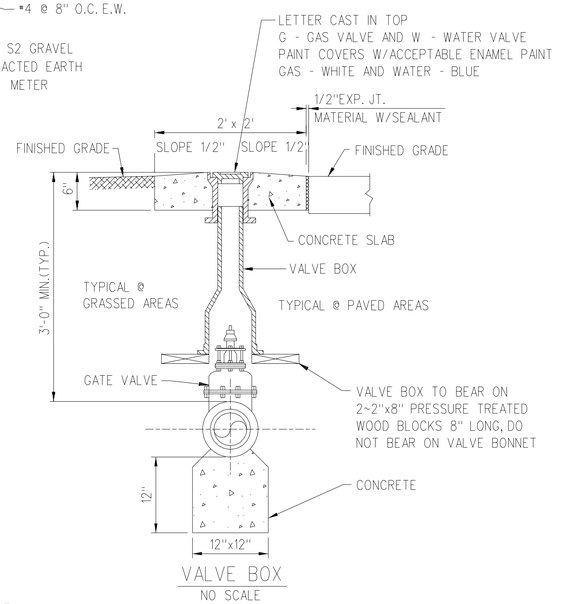
THRUST BLOCKS FOR PRESSURE MAINS
NO SCALE



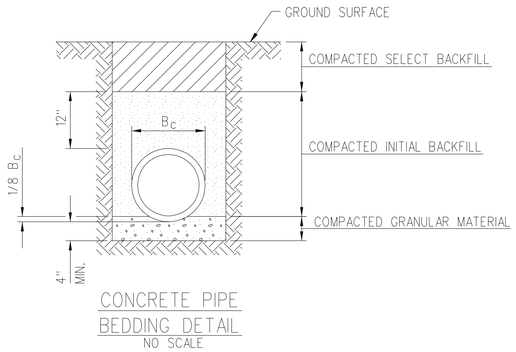
DETAIL "A"
NO SCALE



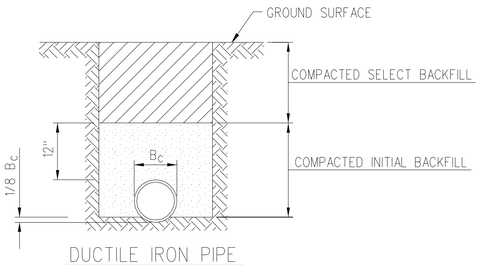
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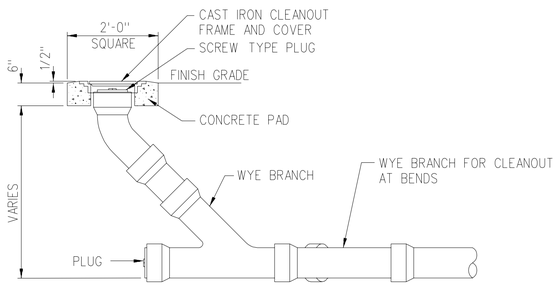
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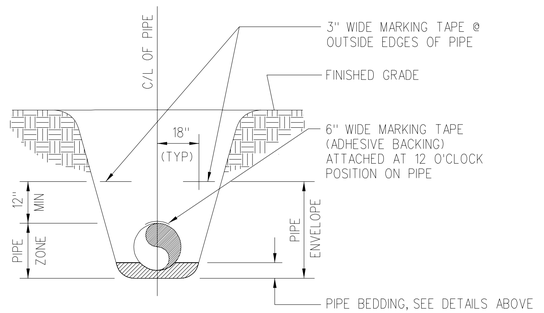
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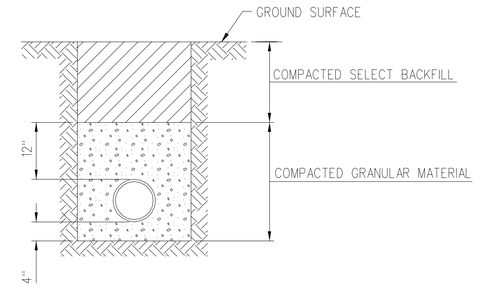


DUCTILE IRON PIPE BEDDING DETAIL
NO SCALE

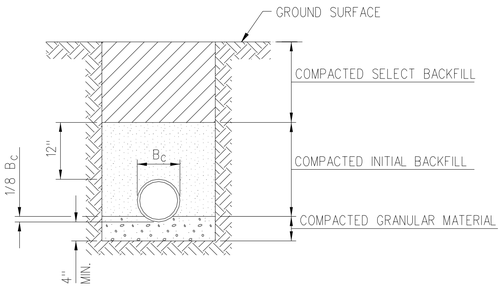


FLUSH GRADE CLEANOUT DETAIL
NO SCALE





PVC GRAVITY PIPE OR HDPE TRENCH BEDDING DETAIL
NO SCALE



PVC PRESSURE PIPE TRENCH BEDDING DETAIL
NO SCALE

MARKING TAPE AND MESSAGES			
PIPE	TAPE COLOR	MESSAGE	MESSAGE COLOR
POTABLE WATER	BLUE	"CAUTION POTABLE WATER MAIN BELOW"	SILVER
FIRE PROTECTION	RED	"CAUTION FIRE PROTECTION BELOW"	BLACK
GAS	YELLOW	"CAUTION GAS MAIN BELOW"	BLACK
ELECTRIC	YELLOW	"CAUTION ELECTRIC LINES BELOW"	BLACK

TYPICAL PIPE MARKING TAPE LOCATION
NO SCALE

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DR CHAPMAN
CH ENGR McGRATH AMMONS
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TECHNICAL BRANCH
DATE 6-24-05
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Rev.	Description	Prep By	Date	Approvd.

STENNIS SPACE CENTER, MISSISSIPPI

STENNIS SPACE CENTER
SBT-22 WASHRACK FACILITY
SITE DETAILS
DATE
APPROVED

EFD, FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
STATE OF MISSISSIPPI
6-24-05

RECORD DRAWING DATE

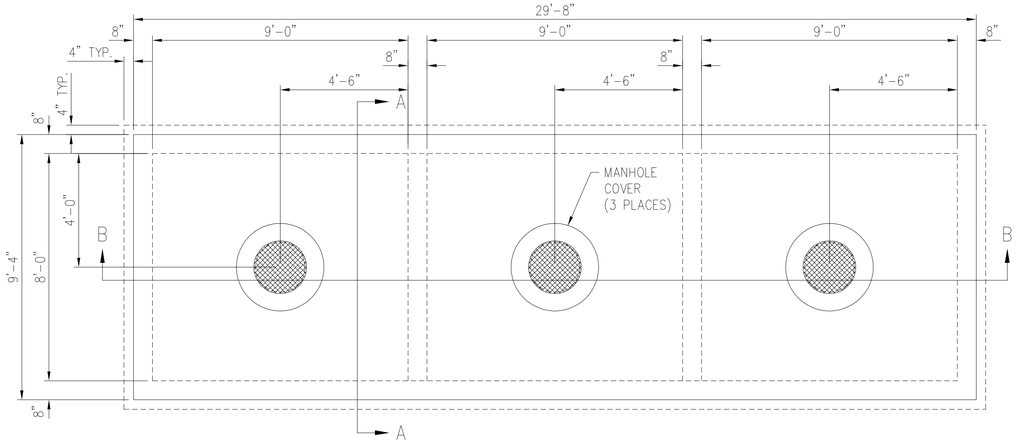
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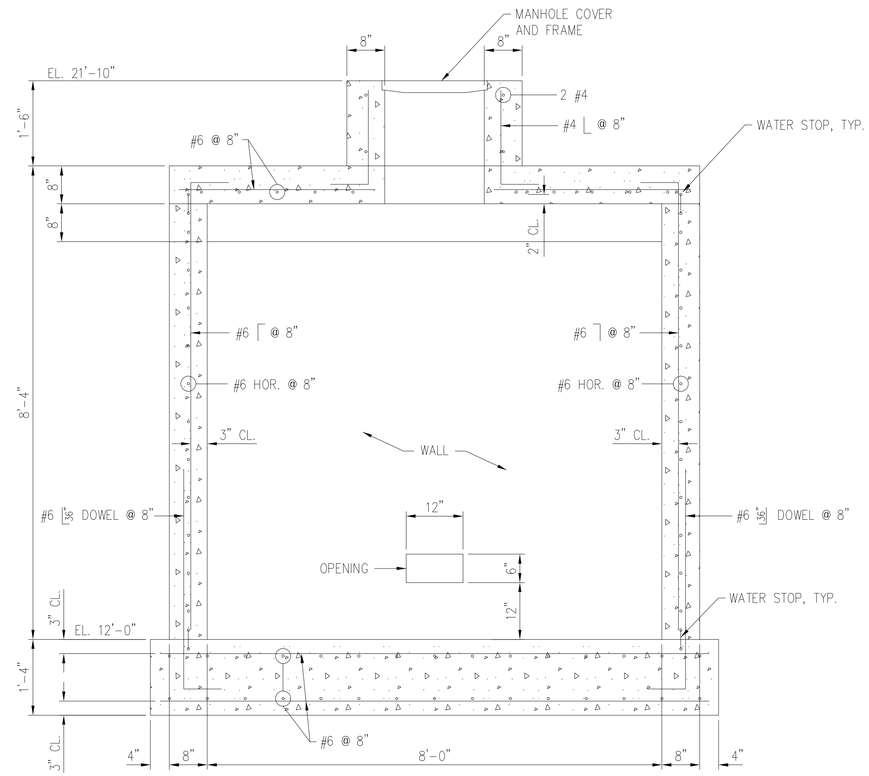
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JH&H JOB: 04103

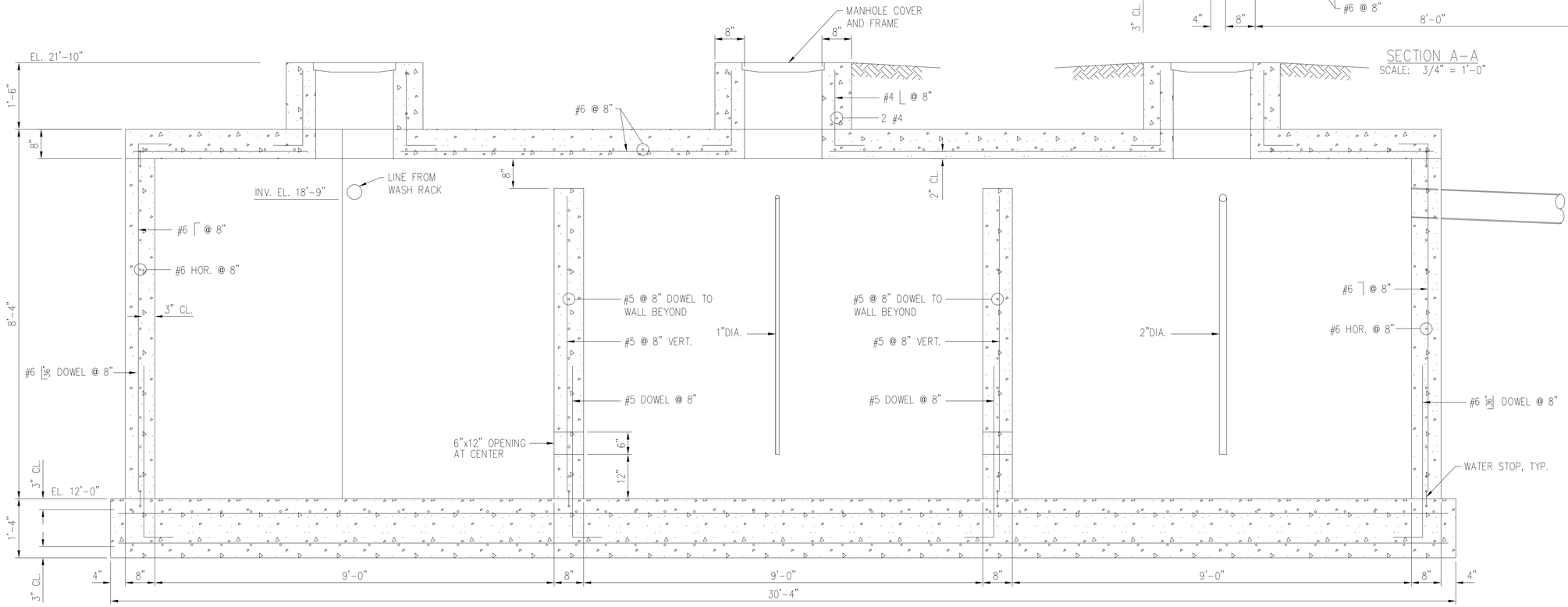
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TOP PLAN
SCALE: 3/8" = 1'-0"



SECTION A-A
SCALE: 3/4" = 1'-0"



SECTION B-B
SCALE: 3/4" = 1'-0"

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SE *04035

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SBT-22 WASHRACK FACILITY

OIL - WATER SEPARATOR

APPROVED DATE

EFD, FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

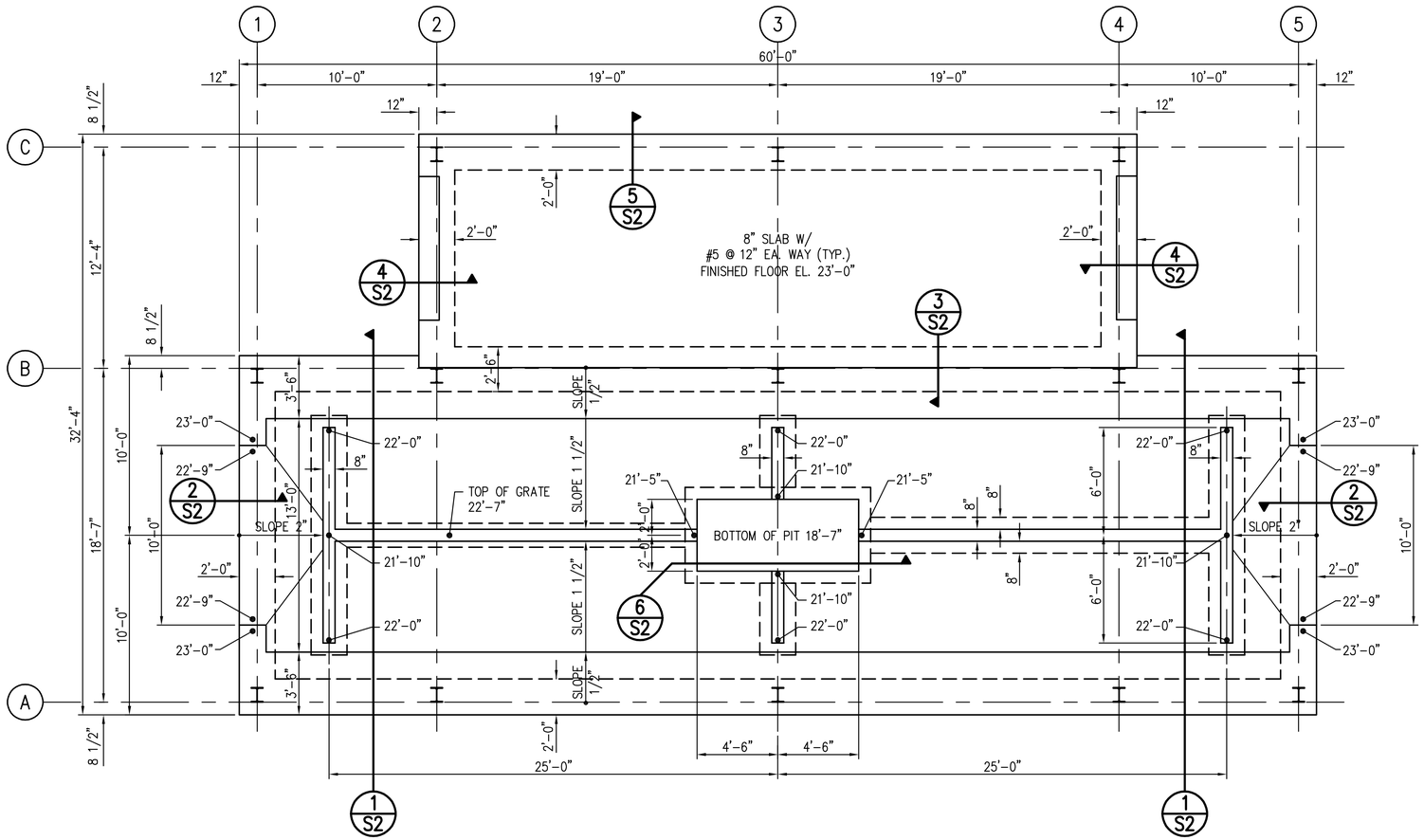
ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
6-24-05
STATE OF MISSISSIPPI

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NAVFAC DRAWING NO.

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FOUNDATION AND FLOOR PLAN

GENERAL NOTES

1. DESIGN LOADS:
   - A. FLOOR LIVE LOAD ---------- 250 PSF
   - B. ROOF LIVE LOAD ---------- 20 PSF
   - C. ADDED DEAD LOAD TO METAL BUILDING ---- 10 PSF
   - D. SOIL BEARING ---------- 1500 PSF
   - E. WIND VELOCITY ASCE-7 ---------- 90 MPH
2. CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI IN 28 DAYS.
3. REINFORCING SHALL CONFORM TO A.S.T.M. A-615, AND SHALL BE GRADE 60.
4. PROVIDE ALL NECESSARY REINFORCING STEEL ACCESSORIES TO HOLD BARS IN PROPER POSITION.
5. WHERE NOT SPECIFICALLY COVERED, REINFORCING SHALL BE DETAILED IN ACCORDANCE WITH ACI STANDARD 315.
6. PROVIDE CORNER BARS OF THE SAME SIZE AND NUMBER AS HORIZONTAL BARS AT ALL CORNERS.
7. CLASS A LAP AT CORNERS, SPLICES AND INTERSECTIONS.
8. FOR MISCELLANEOUS ANGLES, DETAILS, OUTSIDE CONCRETE WORK, ETC. SEE ARCHITECTURAL.
9. 12" BLOCK WALL: REINFORCE WITH 1~#6 AT 24" O.C. DOWEL TO FOUNDATION. SEE SECTION 3/S2.1.

CONCRETE BLOCK LINTELS

	SPAN	BLOCK	REINFORCING
12" WALLS	0' TO 4'-0"	8" DEEP	2 #6 BOT.
	4'-0" TO 9'-0"	16" DEEP	2 #7 BOT.

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SBT-22 WASHRACK FACILITY

FOUNDATION AND FLOOR PLAN

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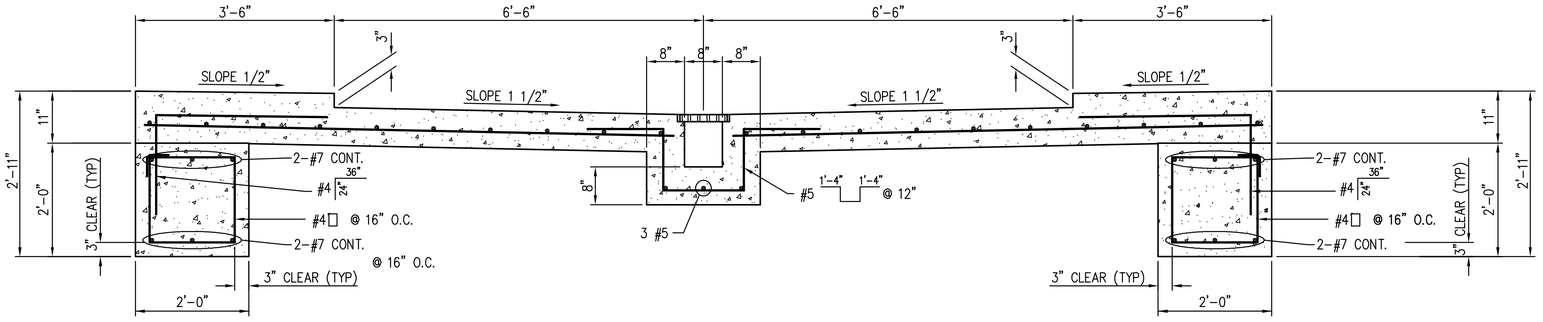
ROBERT KENNETH MCGRATH
REGISTERED PROFESSIONAL ENGINEER
No. K. 6430
6-24-05
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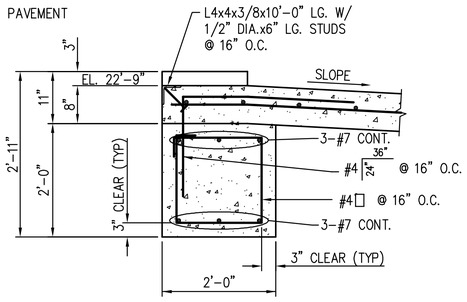
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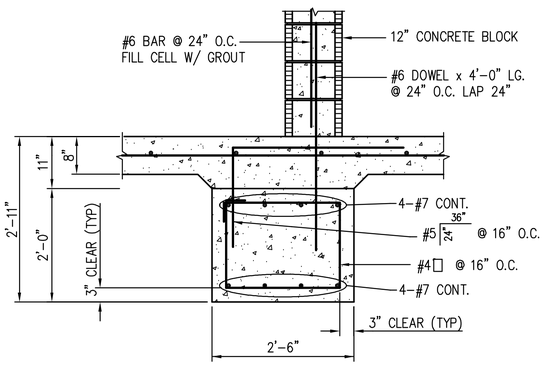
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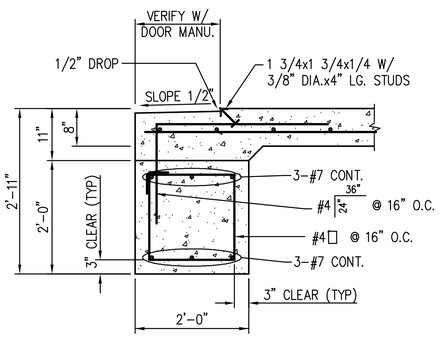
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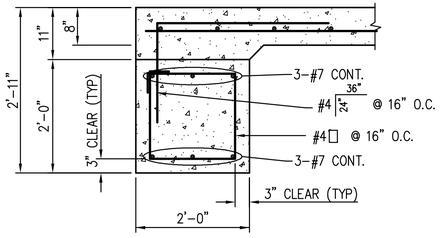
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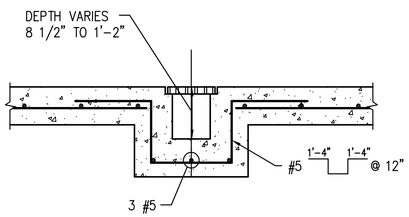
3 S2 3/4"=1'-0"



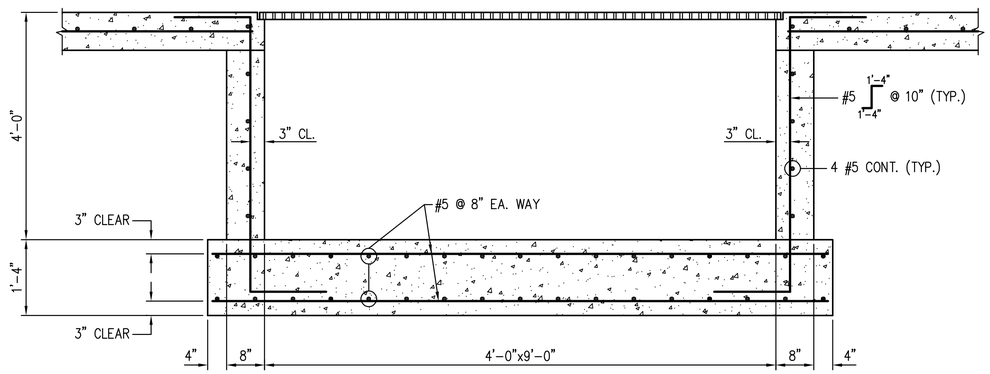
4 S2 3/4"=1'-0"



5 S2 3/4"=1'-0"



TYPICAL TRENCH



6 S2 3/4"=1'-0"

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STENNIS SPACE CENTER

SBT-22 WASHRACK FACILITY

CONCRETE DETAILS

DATE EFD FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

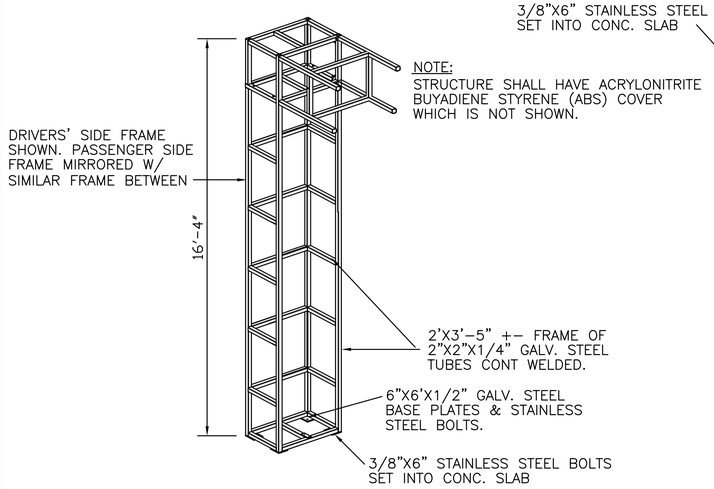
ROBERT KENNETH McGRATH
REGISTERED PROFESSIONAL ENGINEER
6430
6-24-05
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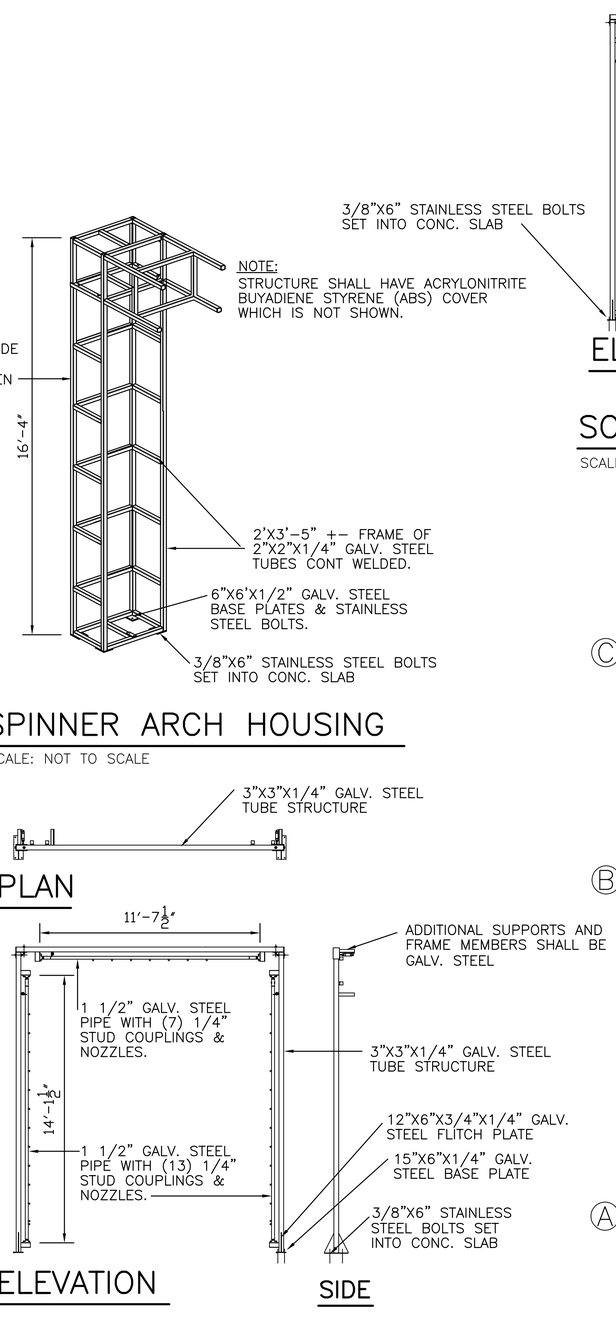
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NOTE:
STRUCTURE SHALL HAVE ACRYLONITRITE BUYADIENE STYRENE (ABS) COVER WHICH IS NOT SHOWN.

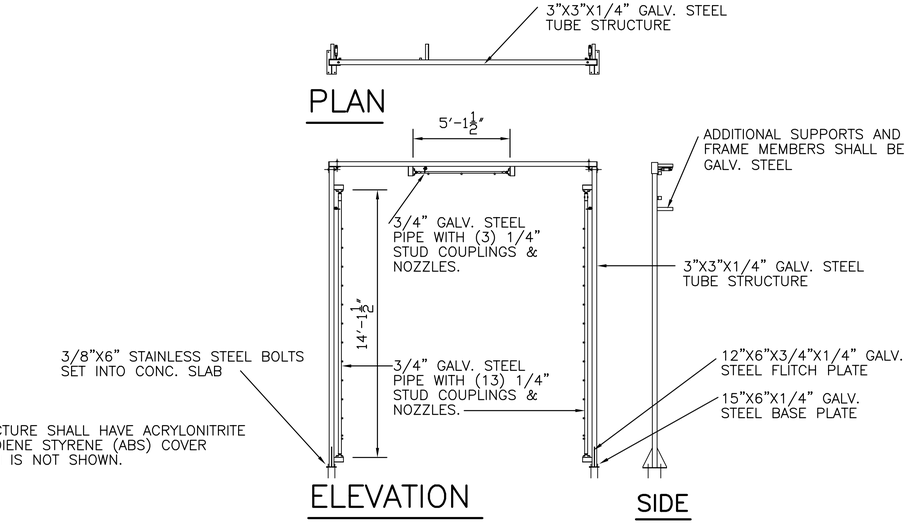
SPINNER ARCH HOUSING

SCALE: NOT TO SCALE



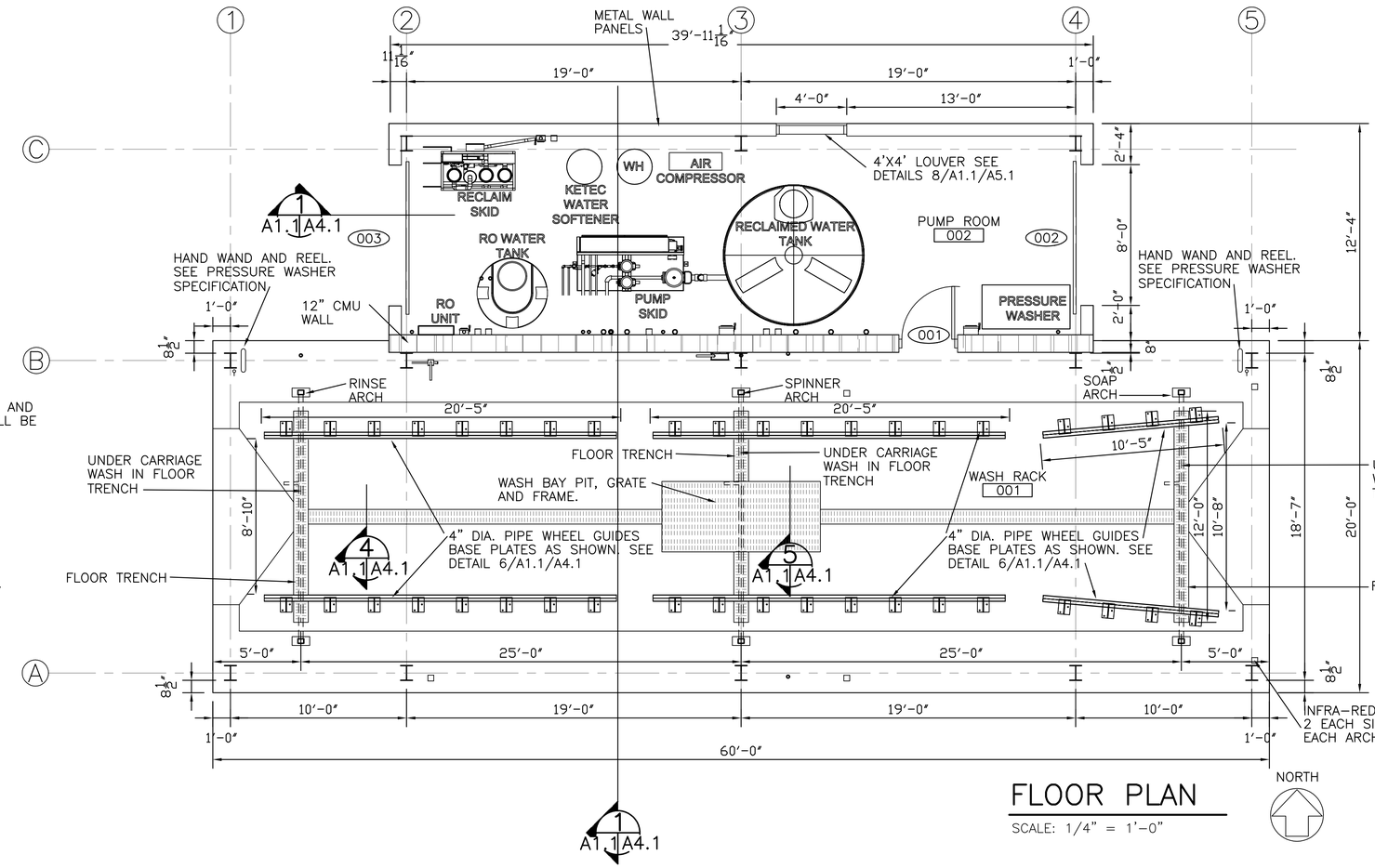
SPINNER ARCH DETAILS

SCALE: 1/4" = 1'-0"



SOAP & RINSE ARCH DETAILS

SCALE: 1/4" = 1'-0"



FLOOR PLAN

SCALE: 1/4" = 1'-0"

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FLOOR PLAN
DATE
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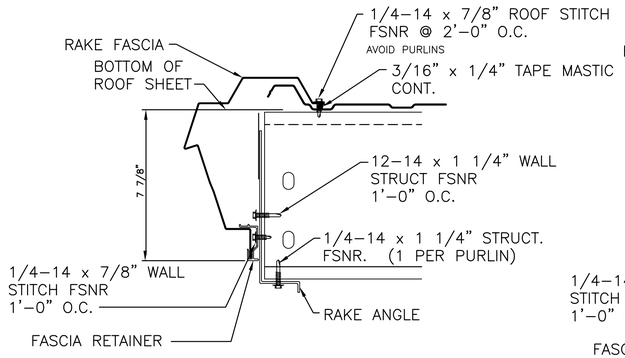
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Southern Division
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REGISTERED ARCHITECT Paul J. Bagley 2069 Jackson, MS

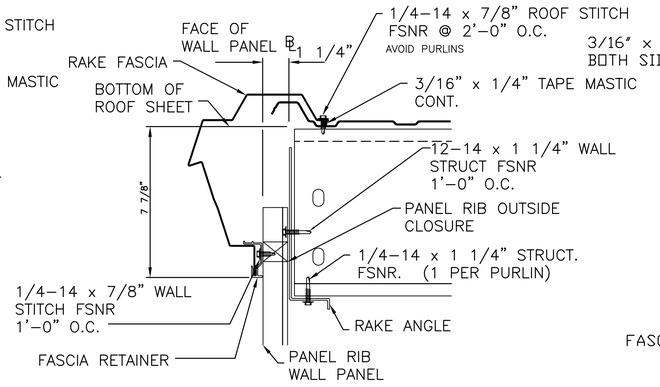
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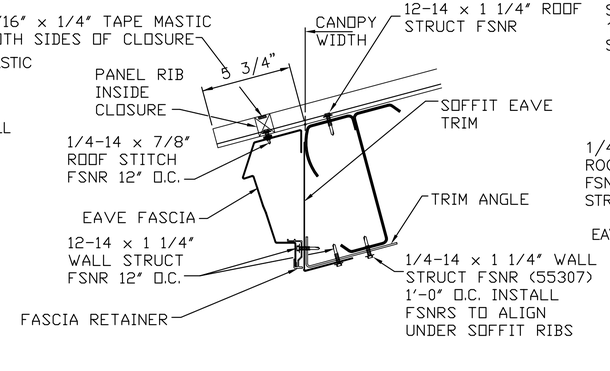
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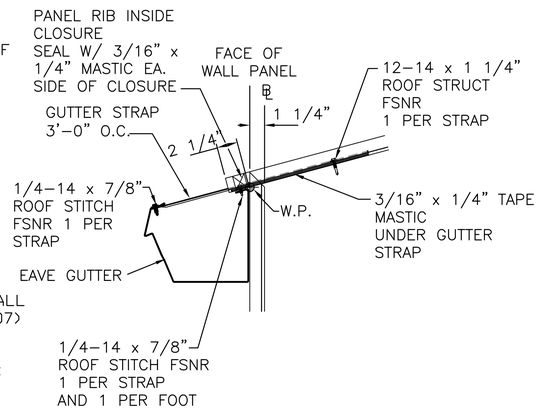
1 A1.2|A1.2 RAKE TRIM DETAIL
SCALE: 3" = 1'–0"



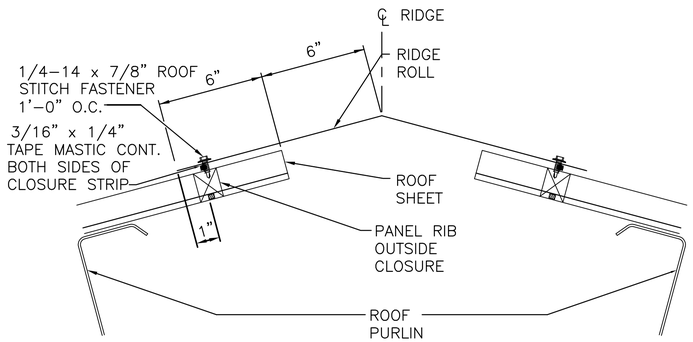
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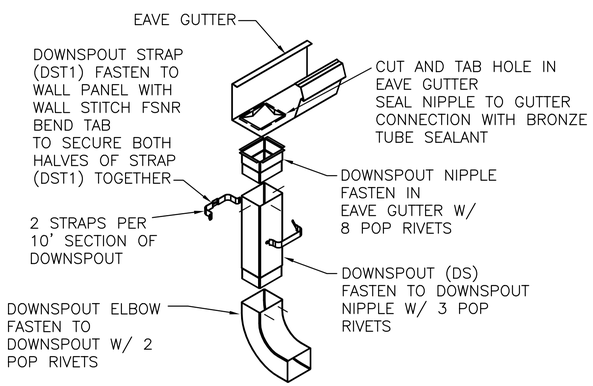
3 A1.2|A1.2 EAVE FASCIA DETAIL
SCALE: 3" = 1'–0"



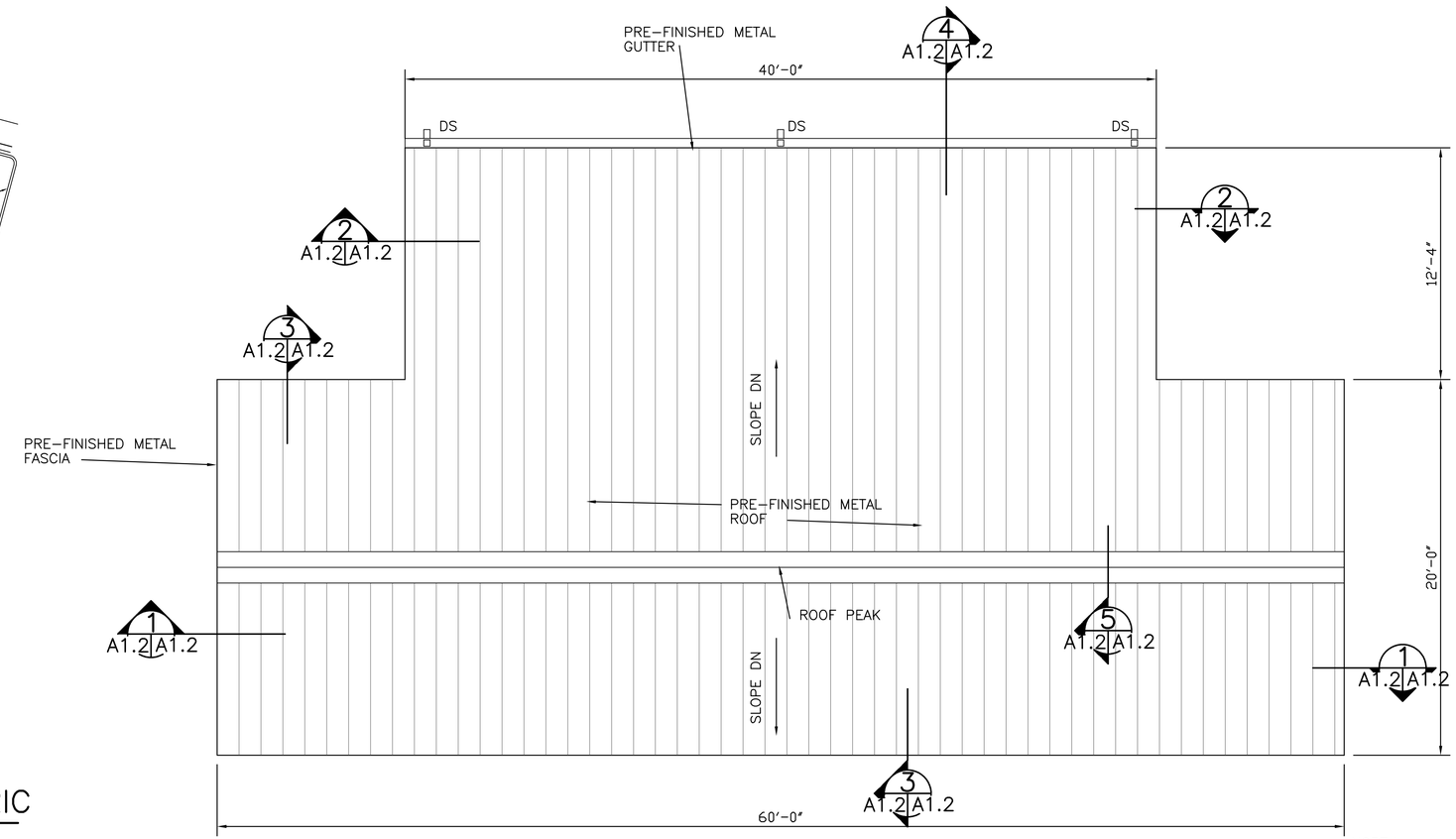
4 A1.2|A1.2 EAVE GUTTER DETAIL
SCALE: 3" = 1'–0"



5 A1.2|A1.2 RIDGE CAP DETAIL
SCALE: 3" = 1'–0"



6 A1.2|A1.2 TYPICAL DOWNSPOUT ISOMETRIC
SCALE: 3" = 1'–0"



ROOF PLAN
SCALE: 1/4" = 1'–0"

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601–355–6200 (F)

DSGN BAGLEY | DR DAY | CHK BAGLEY | SUPV | CH ENGR | SUBMITTED BY (FIRM MEMBER-TITLE) | DATE 06/24/05 | TECHNICAL BRANCH | FPE

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ROOF PLAN AND DETAILS
DATE | EFD FOR COMMANDER, NAVFAC | APPROVED

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Southern Division
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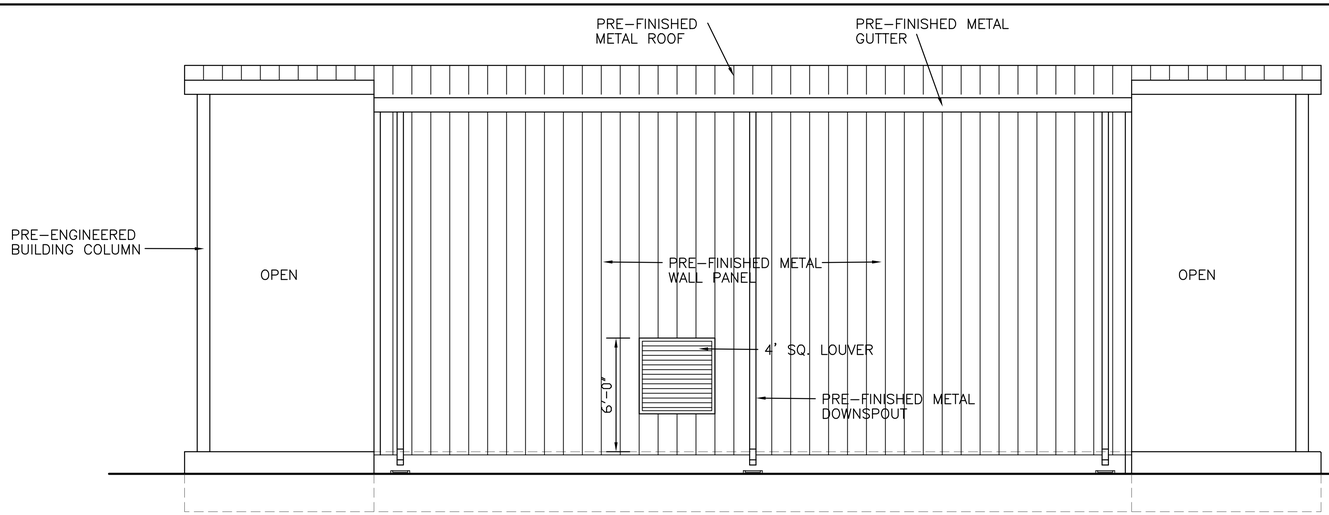
REGISTERED ARCHITECT
Paul J. Bagley
2069
Jackson, MS
STATE OF MISSISSIPPI

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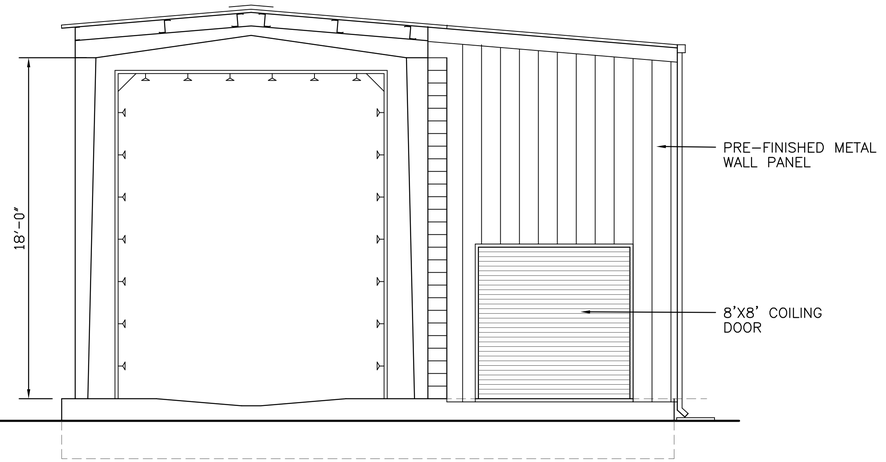
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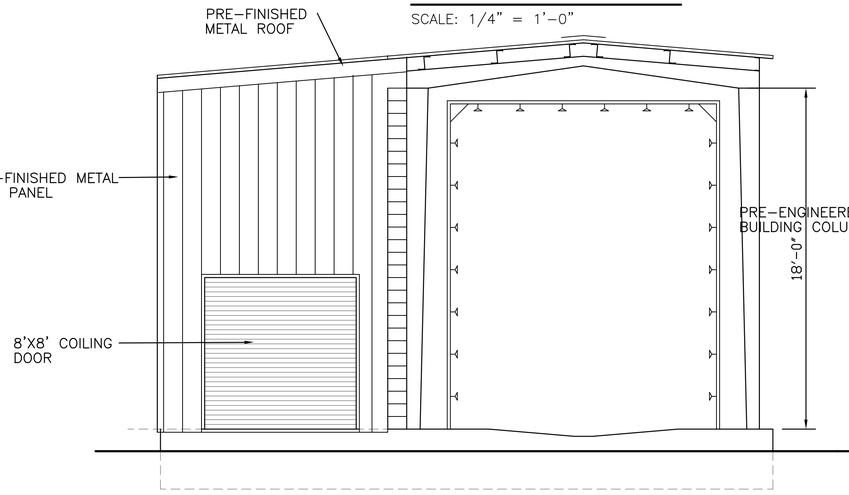
NORTH ELEVATION

SCALE: 1/4" = 1'-0"



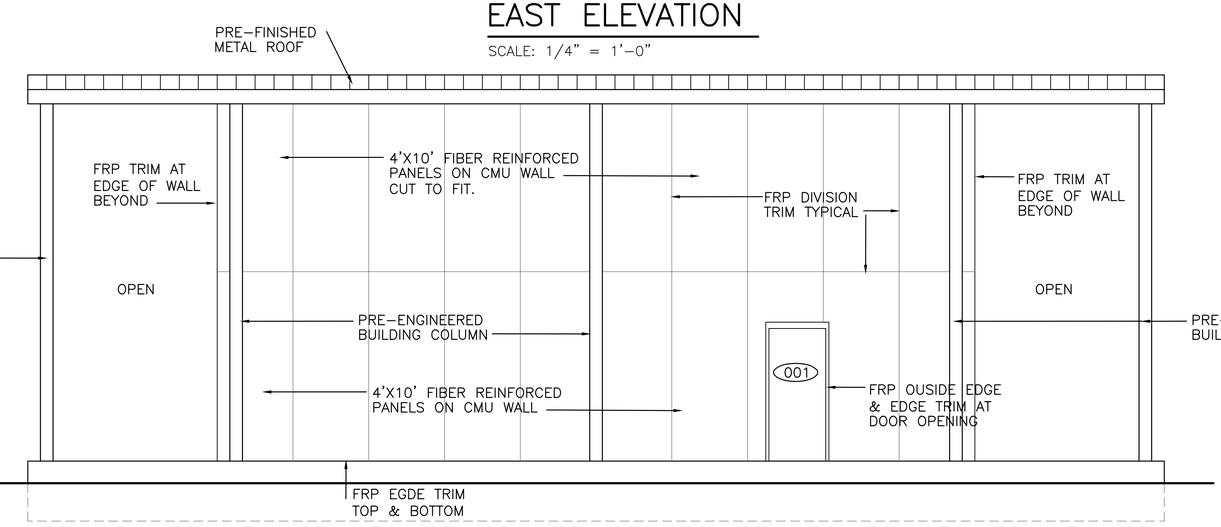
EAST ELEVATION

SCALE: 1/4" = 1'-0"



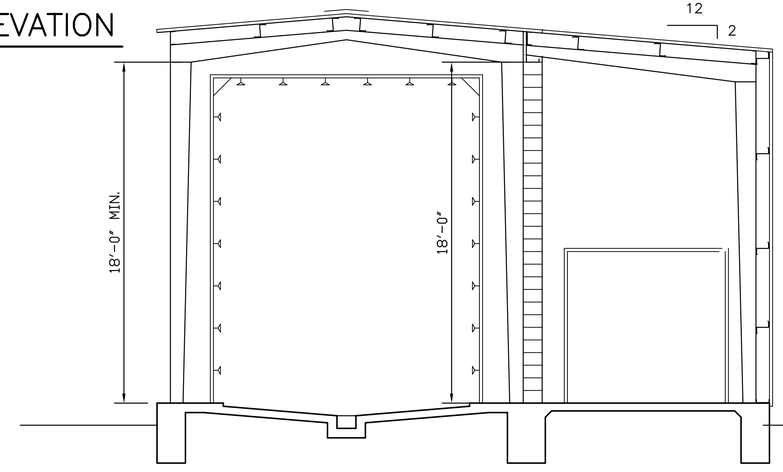
WEST ELEVATION

SCALE: 1/4" = 1'-0"



SOUTH ELEVATION

SCALE: 1/4" = 1'-0"



BUILDING SECTION

1 / A1.1 A4.1

SCALE: 1/4" = 1'-0"

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601-355-6200 (F)
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SUBMITTED BY (FIRM MEMBER-TITLE)
TECHNICAL BRANCH
DATE 06/24/05
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SBT-22 WASHRACK FACILITY

EXTERIOR ELEVATIONS & SECTIONS

DATE

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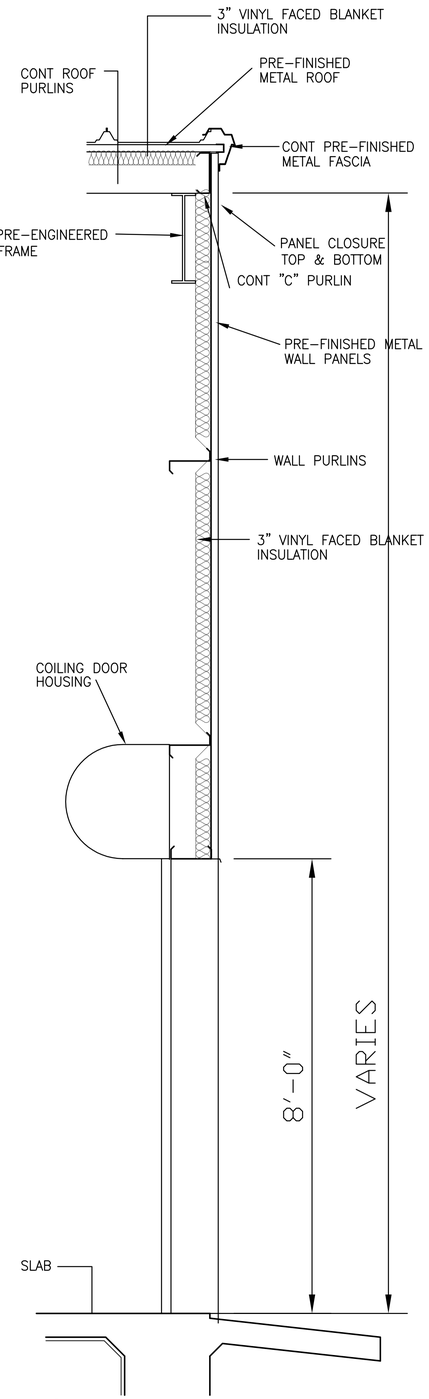
Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

REGISTERED ARCHITECT
Paul J. Bagley
2069
Jackson, MS
STATE OF MISSISSIPPI

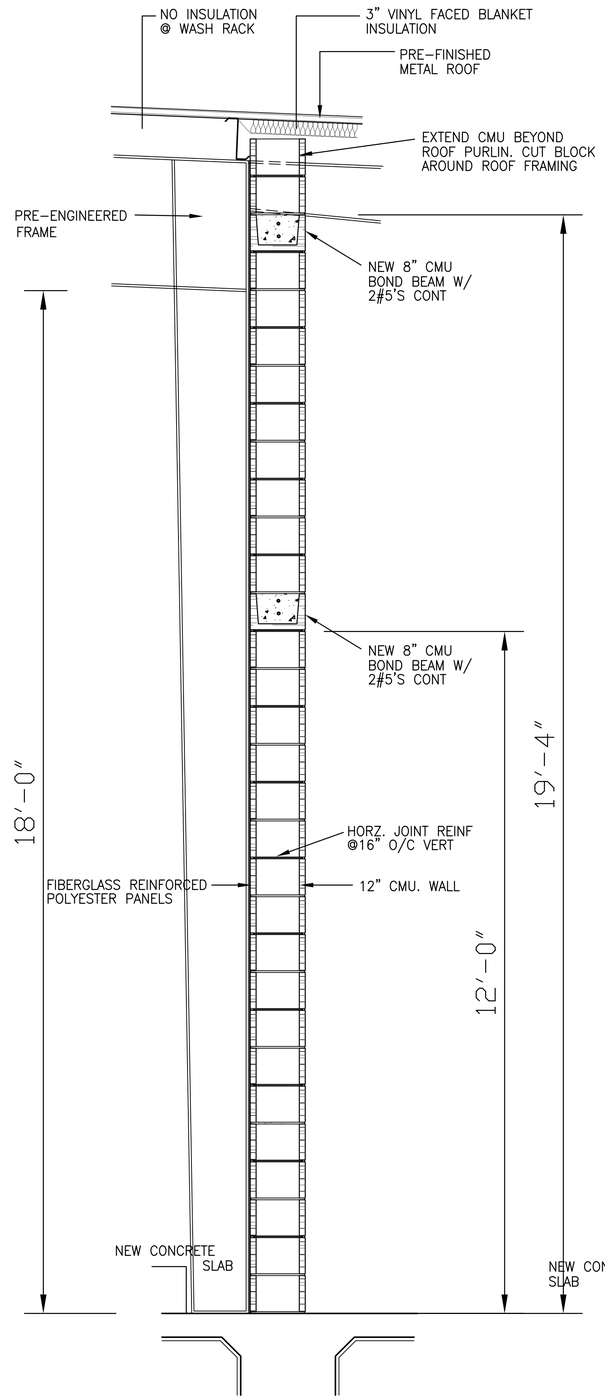
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CONSTRN. CONTR. NO.	
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SHEET	OF .

A2.1

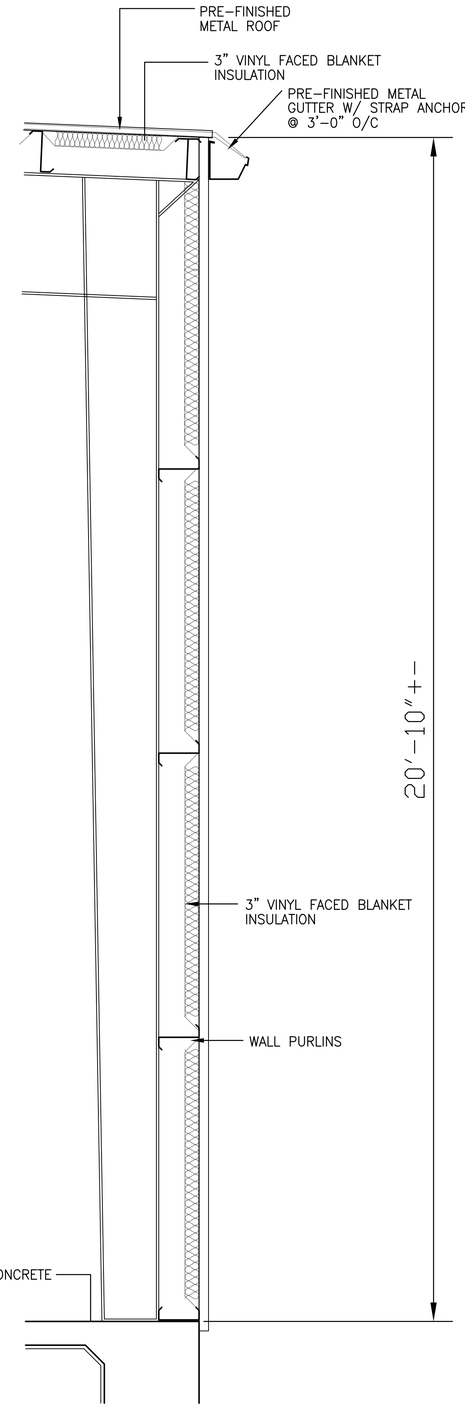
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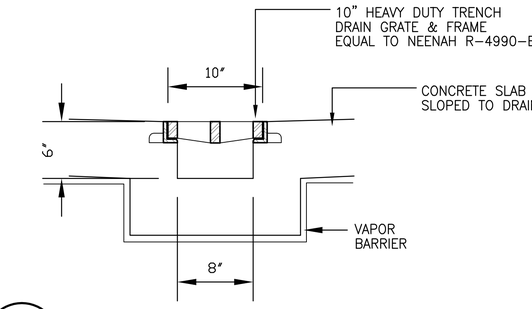
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SCALE 3/4"=1'-0"



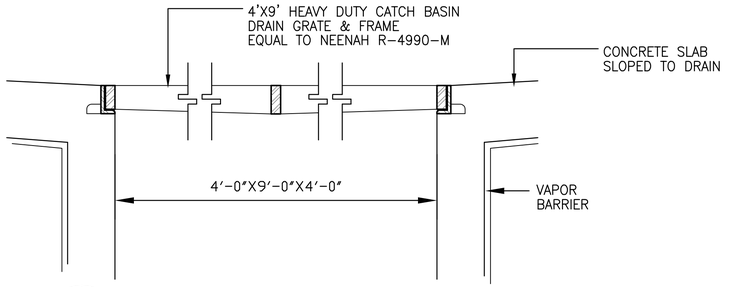
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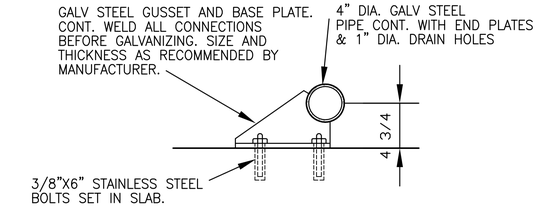
3 A1.1 A4.1 WALL SECTION
SCALE 3/4"=1'-0"



4 A1.1 A4.1 TRENCH DRAIN DETAIL
SCALE 1 1/2"=1'-0"



5 A1.1 A4.1 PIT GRATE DETAIL
SCALE 1 1/2"=1'-0"



6 A1.1 A4.1 WHEEL GUIDE DETAIL
SCALE 1 1/2"=1'-0"

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SUPV CH ENGR
SUBMITTED BY (FIRM MEMBER-TITLE)
TECHNICAL BRANCH
DATE 06/24/05
FPE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI
STENNIS SPACE CENTER
SBT-22 WASHRACK FACILITY
SHEET TITLE
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APPROVED
EFD FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
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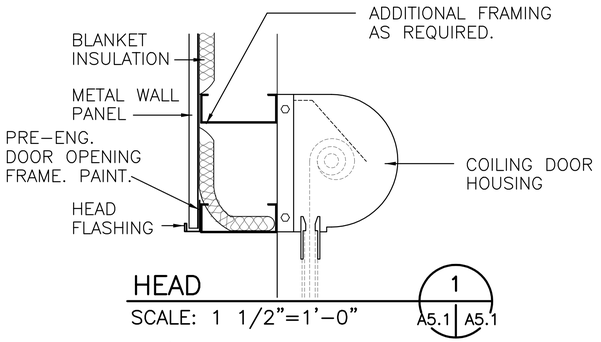
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A4.1

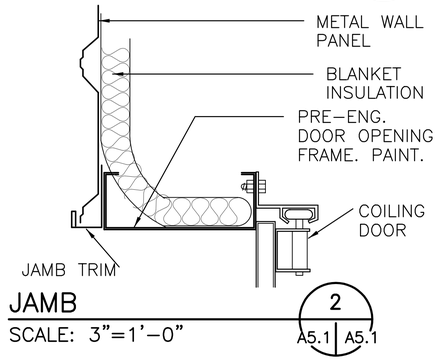
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DOOR AND FRAME SCHEDULE

DOOR NO.	DOOR					FRAME					FIRE RATING LABEL	HARD WARE SET	NOTES	DOOR NO.
	SIZE			MAT.	TYPE	MAT.	TYPE	DETAILS						
	WIDTH	HGT.	THICK					HEAD	JAMB	SILL				
101	3'–0"	7'–0"	1 3/4"	HM	1	HM	1	3/A5.1	4/A5.1	5/A5.1		#1		101
102	8'–0"	8'–0"	–	STEEL	2	HM	2	1/A5.1	2/A5.1	–		–		102
103	8'–0"	8'–0"	–	STEEL	2	HM	2	1/A5.1	2/A5.1	–		–		103



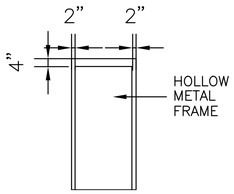
HEAD 1
SCALE: 1 1/2"=1'–0" A5.1 | A5.1



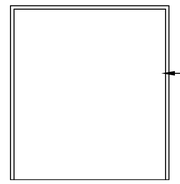
JAMB 2
SCALE: 3"=1'–0" A5.1 | A5.1



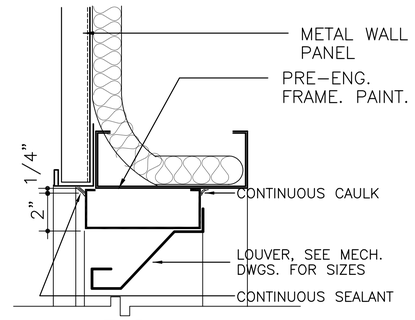
DOOR TYPE #1 DOOR TYPE #2



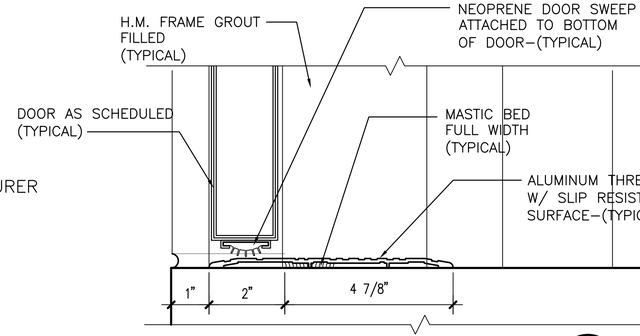
FRAME TYPE #1



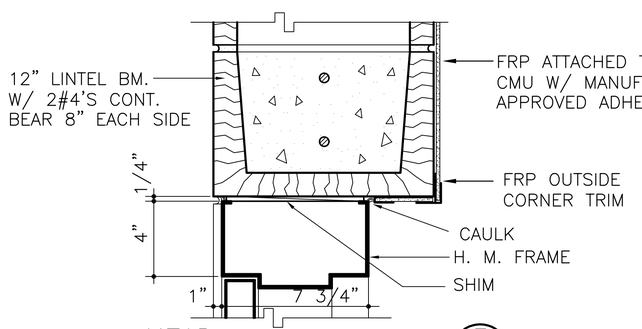
FRAME TYPE #2



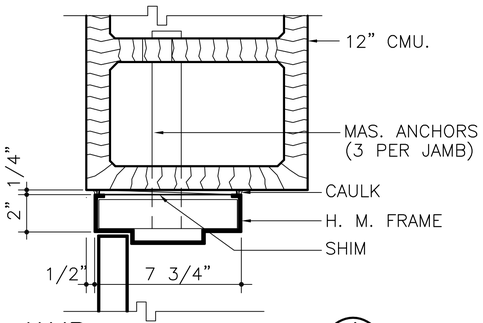
HEAD



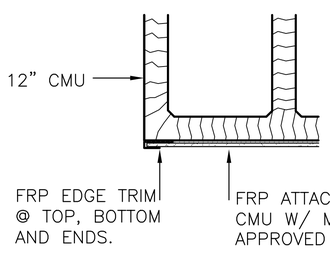
THRESHOLD @ EQUIP. RM. 5
SCALE: 6"=1'–0" A5.1 | A5.1



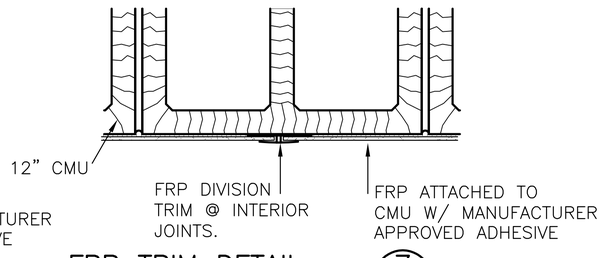
HEAD 3
SCALE: 3"=1'–0" A5.1 | A5.1



JAMB 4
SCALE: 3"=1'–0" A5.1 | A5.1

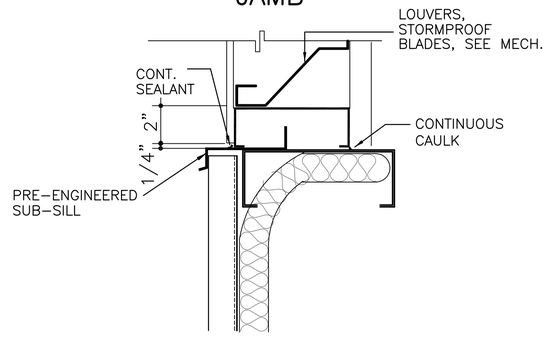


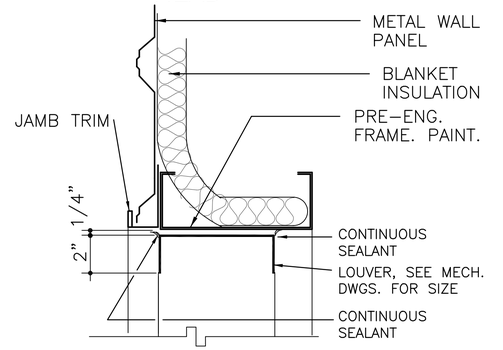
FRP TRIM DETAIL 6
SCALE: 3"=1'–0" A2.1 | A5.1



FRP TRIM DETAIL 7
SCALE: 3"=1'–0" A2.1 | A5.1

JAMB





LOUVER DETAILS 8
SCALE: 3" = 1'–0" A1.1 | A5.1

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DSGN BAGLEY DR DAY CH ENGR CHK BAGLEY
SUPV
SUBMITTED BY (FIRM MEMBER–TITLE)
TECHNICAL BRANCH
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Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

REGISTERED ARCHITECT
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2069
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PLUMBING LEGEND

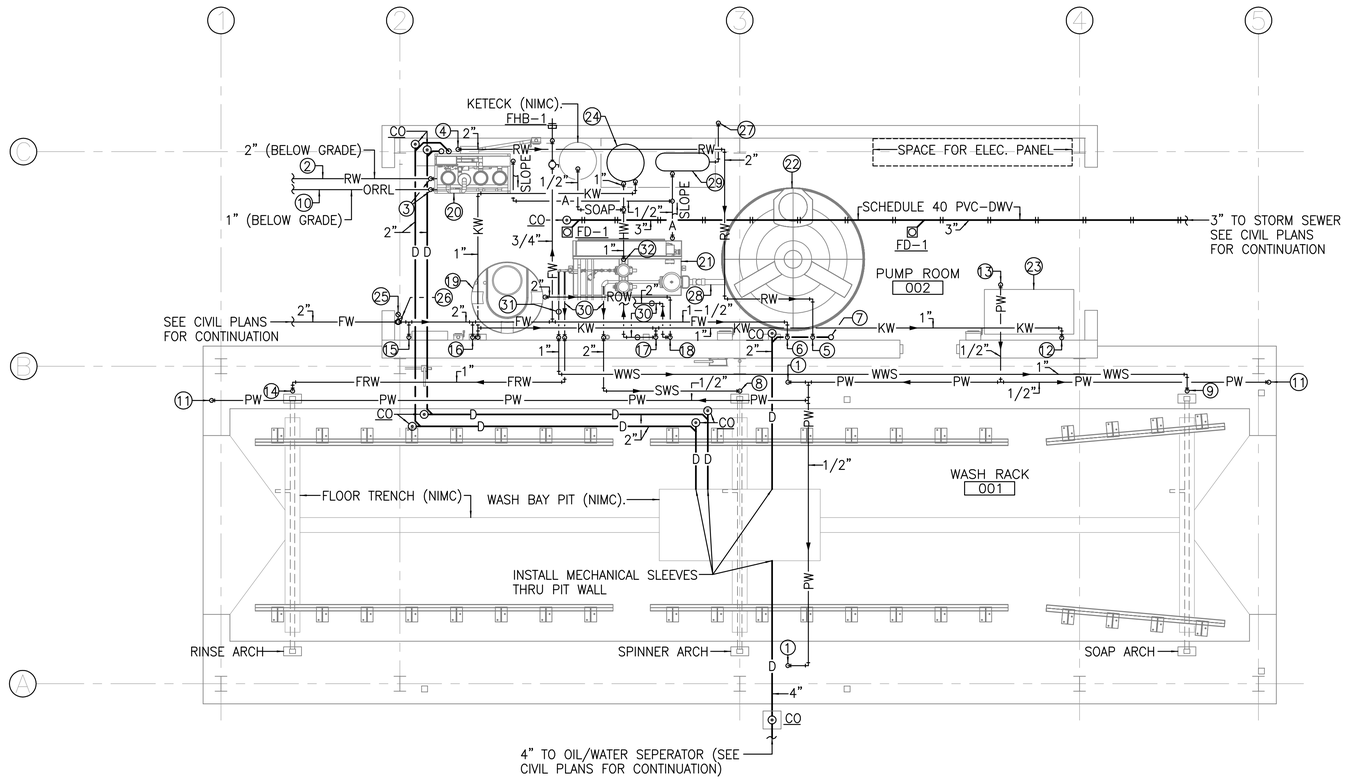
	STORM DRAIN	OR	BALANCING VALVE
OR	GATE VALVE		RELIEF VALVE
OR	BALL VALVE	CO	CLEANOUT
OR	GAS COCK	CO	CLEANOUT
	UNION		THERMOMETER
	PRESSURE REDUCING VALVE		GAGE
	CHECK VALVE; ARROW INDICATES FLOW		CONCRETE THRUST BLOCK

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	COLD WATER	HOT WATER	DRAIN	REMARKS
FD-1	FLOOR DRAIN	–	–	3"	WITH DEEP-SEAL DRAIN TRAP
FHB-1	FREEZE-PROOF HOSE BIBB	3/4"	–	–	FREEZE-PROOF, RECESSED BOX, WITH VACUUM BREAKER

PIPING SCHEDULE

MARK	PRODUCT	PIPE TYPE
PW	PRESSURE WASHER PIPE	GALVANIZED PIPE, SCHEDULE 80
ROW	REVERSE OSMOSIS WATER	TYPE "K" COPPER PIPE, HARD DRAWN
FRW	FINAL RINSE WATER	PVC PIPE, SCHEDULE 80
SWS	SPINNER WATER SUPPLY	GALVANIZED PIPE, SCHEDULE 40
WWS	WASH WATER WITH SOAP	PVC PIPE, SCHEDULE 80
SOAP	SOAP	PVC PIPE, SCHEDULE 80
RW	RECLAIM WATER	PVC PIPE, SCHEDULE 80
FW	FRESH WATER	TYPE "K" COPPER PIPE, HARD DRAWN
HW	HOT WATER	TYPE "K" COPPER PIPE, HARD DRAWN
A	COMPRESSED AIR (175 PSIG)	GALVANIZED PIPE, SCHEDULE 40
D	DRAIN	PVC-DWV PIPE, SCHEDULE 80
ORRL	OZONE RECIRCULATION RETURN LINE	PVC PIPE, SCHEDULE 80
KW	KETECK WATER	TYPE "K" COPPER PIPE, HARD DRAWN



NORTH

FLOOR PLAN – PLUMBING

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

A) "NIMC" DENOTES EQUIPMENT "NOT IN MECHANICAL CONTRACT" (TO BE FURNISHED AND INSTALLED BY OTHERS). MECHANICAL CONTRACTOR SHALL ROUGH-IN AND MAKE FINAL CONNECTIONS. INSTALL UNIONS AND SHUT-OFF VALVES AT EACH CONNECTION TO EQUIPMENT IN ADDITION TO ANY CONTROL VALVES, FLEXIBLE CONNECTORS, ETC.

B) INSTALL DEEP-SEAL TRAP ON ALL FD-1 FLOOR DRAINS.

PLAN NOTES:

1. 1/2" – GALVANIZED PIPE, SCHEDULE 80 FROM PRESSURE WASHER. TURN DOWN AND TERMINATE AT 4'-0" A.F.F. WITH BALL VALVE.
2. 3" – PVC PIPE, SCHEDULE 80 FROM LAST CHAMBER OF OIL/WATER SEPERATOR TO RECLAIM SKID (SEE CIVIL PLANS FOR CONTINUATION).
3. (1) 1" AND (1) 3" – PVC PIPE, SCHEDULE 80 FROM OIL/WATER SEPERATOR TO RECLAIM SKID (WITH SWEEP ELBOWS ON 1").
4. 2" – PVC PIPE, SCHEDULE 80 FROM RECLAIM SKID DISCHARGE. RISE AND RUN ON UNDERSIDE OF ROOF STRUCTURE TO RECLAIM WATER TANK.
5. 2" – PVC PIPE, SCHEDULE 80 TO RECLAIM WATER TANK.
6. 1-1/2" COPPER PIPE MAKE UP WATER. DROP AND INSTALL BALL VALVE FOLLOWED BY ANGLED AIR VALVE IN DROP TO RECLAIMED WATER TANK (ANGLED AIR VALVE FURNISHED BY WASHRACK CONTRACTOR).
7. 2" – PVC PIPE, SCHEDULE 80 FROM TANK OVERFLOW.
8. 2" – GALVANIZED PIPE, SCHEDULE 40 FROM HIGH PRESSURE PUMP. TERMINATE 17'-0" A.F.F. WITH 1-1/2" MALE HOSE BARB TURNED DOWN.
9. 1" – PVC PIPE, SCHEDULE 80 (HW) FROM PUMP SKID. TERMINATE 17'-0" A.F.F. (INSTALL 3/4" FEMALE ADAPTORS TURNED DOWN AT EACH END OF RUN).
10. 1" – PVC PIPE, SCHEDULE 80 FROM MIDDLE CHAMBER OF OIL/WATER SEPERATOR TO RECLAIM SKID (SEE CIVIL PLANS FOR CONTINUATION).
11. 1/2" – GALVANIZED PIPE, SCHEDULE 80 FROM PRESSURE WASHER. TURN DOWN AND CONNECT TO HAND WAND (SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION).
12. 1" – COPPER PIPE TO PRESSURE WASHER. (GARDEN HOSE TYPE CONNECTOR TO PRESSURE WASHER).
13. 1/2" – GALVANIZED PIPE, SCHEDULE 80 (WITH HIGH PRESSURE FITTINGS) FROM PRESSURE WASHER.
14. 1" – PVC PIPE, SCHEDULE 80 FROM PUMP SKID. TERMINATE 17'-0" A.F.F. (INSTALL 3/4" FEMALE ADAPTORS TURNED DOWN AT EACH END OF RUN).
15. RO UNIT (NIMC). CONNECT 1" COPPER PIPE. FED BY CITY WATER.
16. KETECK FLOW METER (NIMC) . CONNECT 1" COPPER PIPE. FED BY CITY WATER.
17. 1" – COPPER PIPE TO WASH PUMP ON PUMP SKID. INSTALL BALL VALVE IN LINE BEFORE PUMP. FED FROM WARM KETECK WATER.
18. 2" – PVC PIPE, SCHEDULE 80 FROM RO WATER TANK TO RINSE PUMP ON PUMP SKID.
19. RO WATER TANK (NIMC).
20. RECLAIM SKID (NIMC). PIPE (2) 2" – PVC PIPE, SCHEDULE 80 TO BAY PIT.
21. PUMP SKID AND PUMPS (NIMC).
22. RECLAIMED WATER TANK (NIMC).
23. PRESSURE WASHER (NIMC).
24. ELECTRIC WATER HEATER. CONNECT (2) 1" COPPER PIPE. FED BY KETECK WATER.
25. PRESSURE GAUGE IN RISER, 48" A.F.F.
26. 2" FRESH WATER. RISE AND RUN ON UNDERSIDE OF ROOF STRUCTURE, INSTALL SHUT-OFF VALVE IN RISER 3'-0" A.F.F.. INSTALL CONCRETE THRUST BLOCK (SEE DETAIL) AT BASE OF RISER.
27. DRAIN FROM AIR COMPRESSOR. EXTEND THRU EXTERIOR WALL AND TURN DOWN WITH 90° "ELL". INSTALL INSECT SCREEN ON END OF PIPE.
28. 3" – PVC PIPE, SCHEDULE 80 FROM RECLAIMED WATER TANK TO HIGH PRESSURE PUMP ON PUMP SKID WITH BALL VALVE.
29. AIR COMPRESSOR (SEE DETAIL).
30. RUN PIPING 2'-0" A.F.F.
31. FLOOR-MOUNTED PIPE SUPPORT (TYPICAL; SEE DETAIL). SEE SPEC. FOR SPACING.
32. 1" – COPPER PIPE, SCHEDULE 80 FROM WATER HEATER. TURN DOWN AT PUMP SKID.

4' 0 4' 8"

SCALE: 1/4" = 1'-0"

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DSGN GRIFFIN DR GRIFFIN CHK BUTLER
SUPV CHF ENGR
SUBMITTED BY (FIRM MEMBER-TITLE):
TECHNICAL BRANCH
FPE

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STENNIS SPACE CENTER, MISSISSIPPI

STENNIS SPACE CENTER
SBT-22 WASHRACK FACILITY
FLOOR PLAN – PLUMBING

ETD DATE APPROVED

EFD FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

DAVID S. BUTLER REGISTERED PROFESSIONAL ENGINEER 4335 STATE OF MISSISSIPPI

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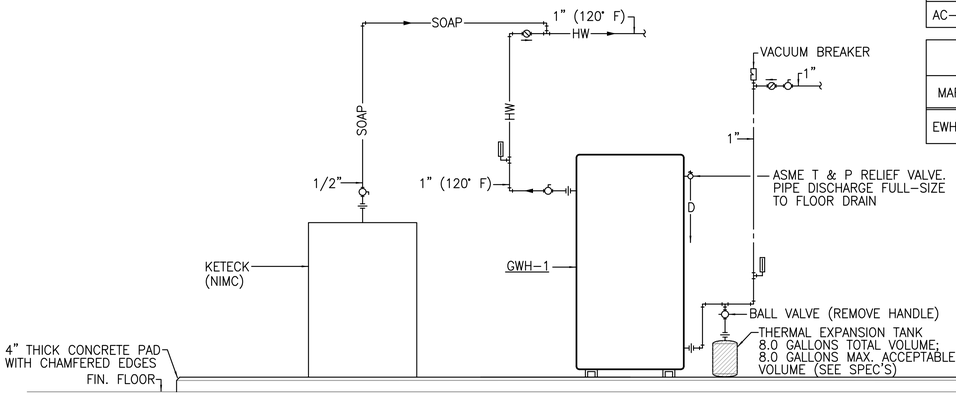
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AIR COMPRESSOR SCHEDULE (2-STAGE)

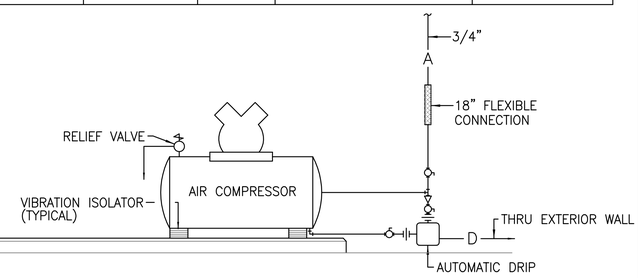
MARK	STOR. CAP (GAL.)	CFM	PSI	ELECT. CHARACTERISTICS	NOTES
AC-1	30	9.7	175	3HP – 460V – 3PH	SEE SPEC.

WATER HEATER/STORAGE TANK SCHEDULE

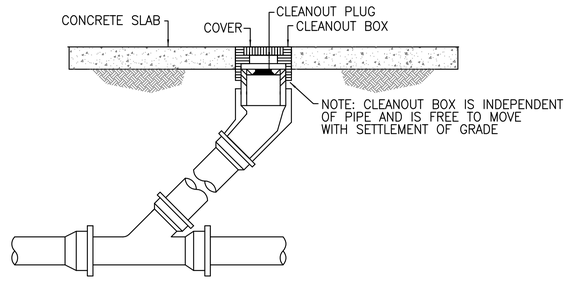
MARK	DESCRIPTION	STORAGE CAP. (GALLONS)	INPUT (BTU/HR)	ELECT. CHARACTERISTICS	RECOVERY RATE (GPH @ 100° RISE)
EWH-1	ELECTRIC	119	200,000	45KW-460V-3PH-54 AMPS	191



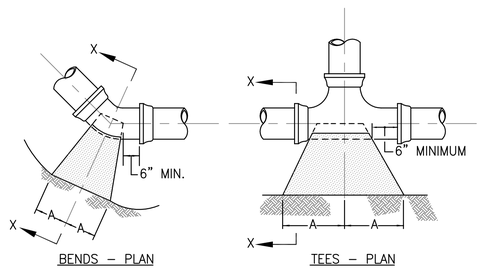
GAS WATER HEATER INSTALLATION DETAIL
NOT TO SCALE



AIR COMPRESSOR INSTALLATION DETAIL
NOT TO SCALE

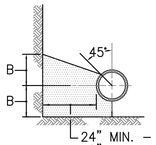


EXTERIOR FLUSH GRADE CLEANOUT DETAIL
NOT TO SCALE

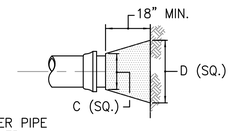


BENDS – PLAN

TEES – PLAN



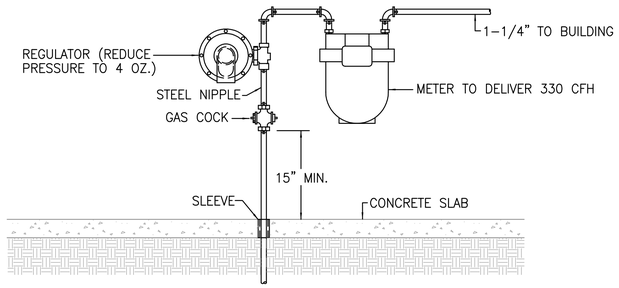
SECTION X – X
BENDS AND TEES



PLAN & ELEVATION
PLUGS

SIZE	1/4 BENDS		1/8 BENDS		1/16 BENDS		TEES		PLUGS	
	A	B	A	B	A	B	A	B	C	D
2	8	6	8	6	8	6	8	6	6	12
2-1/2	8	6	8	6	8	6	8	6	6	12

STANDARD THRUST BLOCKS FOR WATER MAINS
NOT TO SCALE



GAS METER AND REGULATOR INSTALLATION DETAIL
NOT TO SCALE

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DAVID S. BUTLER
REGISTERED PROFESSIONAL ENGINEER
ENGINEER
4335
STATE OF MISSISSIPPI

RECORD DRAWING DATE

CODE I.D. NO.	80091
DRAWING SIZE:	D
SPEC. NO.	
CONSTRN. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET	OF

P5.1

JH&H JOB: 04103

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FAN SCHEDULE

NO.	TYPE	CAPACITY		MOTOR		RPM	APPOXIMATE OPERATING WT., LBS	REMARKS
		CFM	S.P., IN. W.C.	HP	VOLTAGE			
F–1	IN–LINE CENTRIFUGAL	2990	0.30	3/4	115V/1PH	1140	130	① ②

NOTES: ① DIRECT DRIVE ②PROVIDE DISCONNECT SWITCH, SPRING VIBRATION ISOLATORS, INLET GUARD, HIGH–PRO POLYESTER COATING.

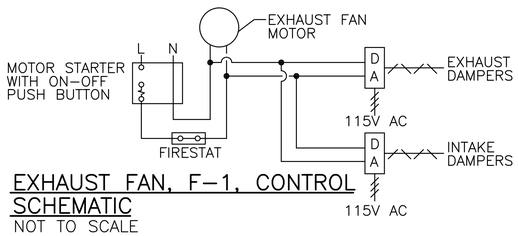
HVAC LEGEND

(T)	THERMOSTAT
◪	MANUAL MOTOR STARTER WITH ON–OFF PUSH BUTTON
—·—(M)	MOTORIZED DAMPER
A.F.F.	ABOVE FINISHED FLOOR

ELECTRIC FIRED UNIT HEATER SCHEDULE

NO.	TYPE	INPUT KW	VOLTAGE	ENTERING AIR FLOW @70° (CFM)	MOTOR			APPOXIMATE OPERATING WT., LBS	REMARKS
					HP	VOLTAGE	RPM		
EUH–1	PROPELLER	30.0	480V – 3PH	2000	1/15	480V/3PH	1550	130	① ② ③

NOTES: ① PROVIDE LOUVER DIFFUSER FOR VERTICAL HEATER MOUNTING ② PROVIDE MOUNTING BRACKETS AND DUST SHIELD
③ PROVIDE 24 VOLT WALL THERMOSTAT, 480V/24V CONTROL TRANSFORMER AND RELAYS.

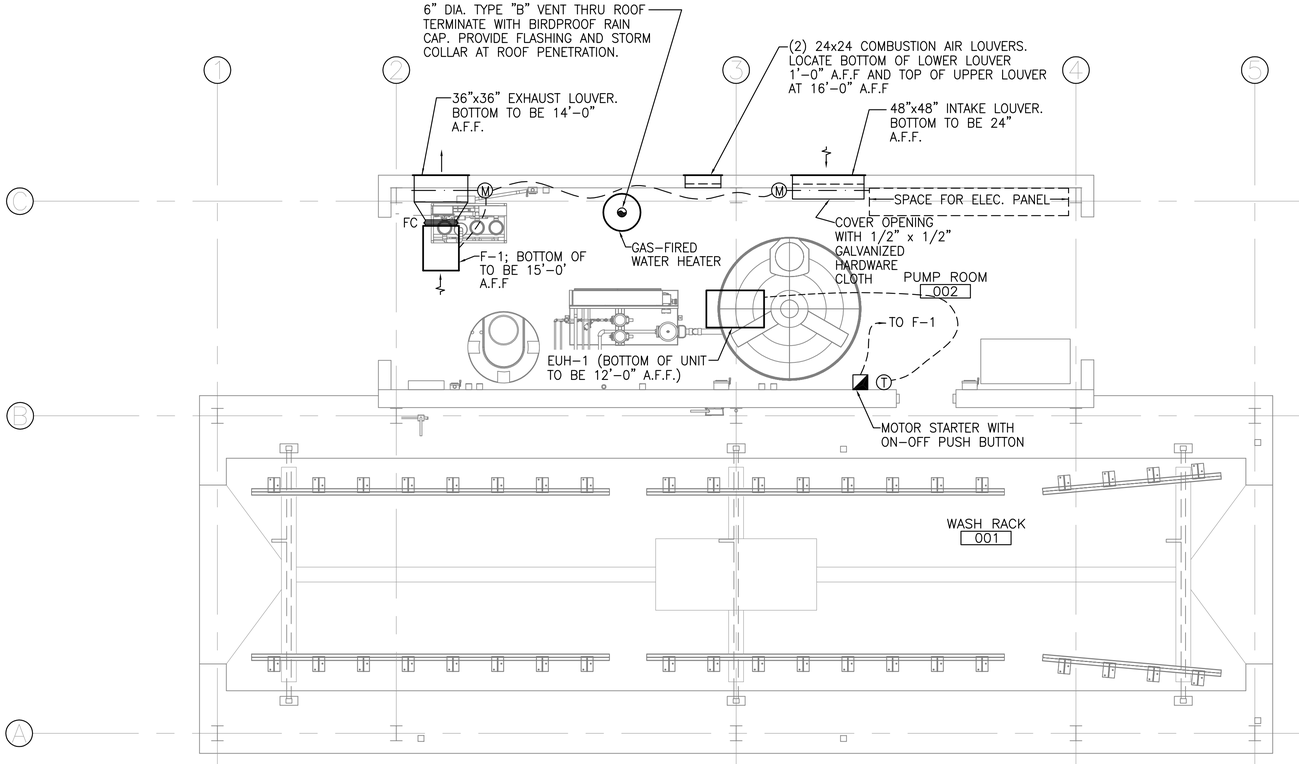


EXHAUST FAN, F–1, CONTROL SCHEMATIC

NOT TO SCALE

SEQUENCE OF OPERATION, F–1 EXHAUST FAN

1. THE EXHAUST FAN SHALL BE MANUALLY CONTROLLED START–STOP. WHEN IN THE "ON" MODE, THE EXHAUST AND INTAKE DAMPERS SHALL OPEN AND THE FAN SHALL OPERATE. WHEN IN THE "OFF" MODE, THE DAMPERS SHALL CLOSE AND THE FAN SHALL STOP.
2. THE FAN SHALL STOP AND THE DAMPERS SHALL CLOSE ANYTIME THE TEMPERATURE OF THE AIR EXCEEDS THE FIRESTAT SETTING.



NORTH

FLOOR PLAN – HEATING AND VENTILATING

SCALE: 1/4" = 1'–0"

4' 0 4' 8"

SCALE: 1/4" = 1'–0"

JH&H JOB: 04103

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SUBMITTED BY (FIRM MEMBER–TITLE):
TECHNICAL BRANCH
FPE
DATE 05–06–05

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

STENNIS SPACE CENTER

NASA WASHRACK FACILITY

HVAC–FLOOR PLAN, DETAIL & SCHEDULE

DATE

APPROVED

EFD FOR COMMANDER, NAVFAC

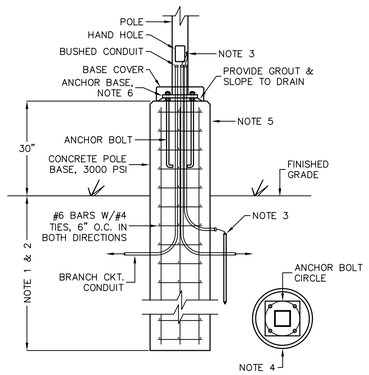
Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

DAVID S. BUTLER, JR.
REGISTERED PROFESSIONAL
ENGINEER
4335
STATE OF MISSISSIPPI

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DETAIL NOTES:

1. DEPTH OF POLE BASE BELOW FINISHED GRADE SHALL BE THE FOLLOWING:
   - 20'–0" POLE HEIGHT: 6'–0"
   - 25'–0" POLE HEIGHT: 7'–6"
   - 30'–0" POLE HEIGHT: 8'–6"
   - 35'–0" POLE HEIGHT: 10'–0"
2. POLE BASE DEPTHS ARE FOR INSTALLATION IN GOOD EARTH & SHALL BE MEASURED FROM THE LOWEST POINT AT WHICH THE FINISHED GRADE WILL CROSS THE BASE.
3. BOND BRANCH CIRCUIT GROUND CONDUCTOR & METALLIC CONDUIT TO POLE. WHERE PVC CONDUITS ARE USED FOR BRANCH CIRCUITRY, PROVIDE GROUND ROD AT POLE & BOND TO POLE USING #8 AWG CONDUCTOR.
4. POLE BASE DIAMETER SHALL PROVIDE A MIN. OF 3" CONCRETE COVERAGE BEYOND ANCHOR BOLT CIRCLE. POLE BASE DIAMETER SHALL BE LARGE ENOUGH TO ALLOW THE ANCHOR BASE OR BASE COVER TO SET ATOP WITHOUT ANY OVERHANG.
5. PROVIDE 45° CHAMPHER ON ALL EXPOSED EDGES. TROWEL FINISH AND RUB SMOOTH ALL EXPOSED CONCRETE.
6. PROVIDE LEVELING NUTS & INSTALL POLE LEVEL, PLUMB AND SQUARE.

SYMBOL "AA" & "BB" LIGHTING FIXTURES

TYPICAL POLE BASE DETAIL

NO SCALE

LIGHTING FIXTURE SCHEDULE

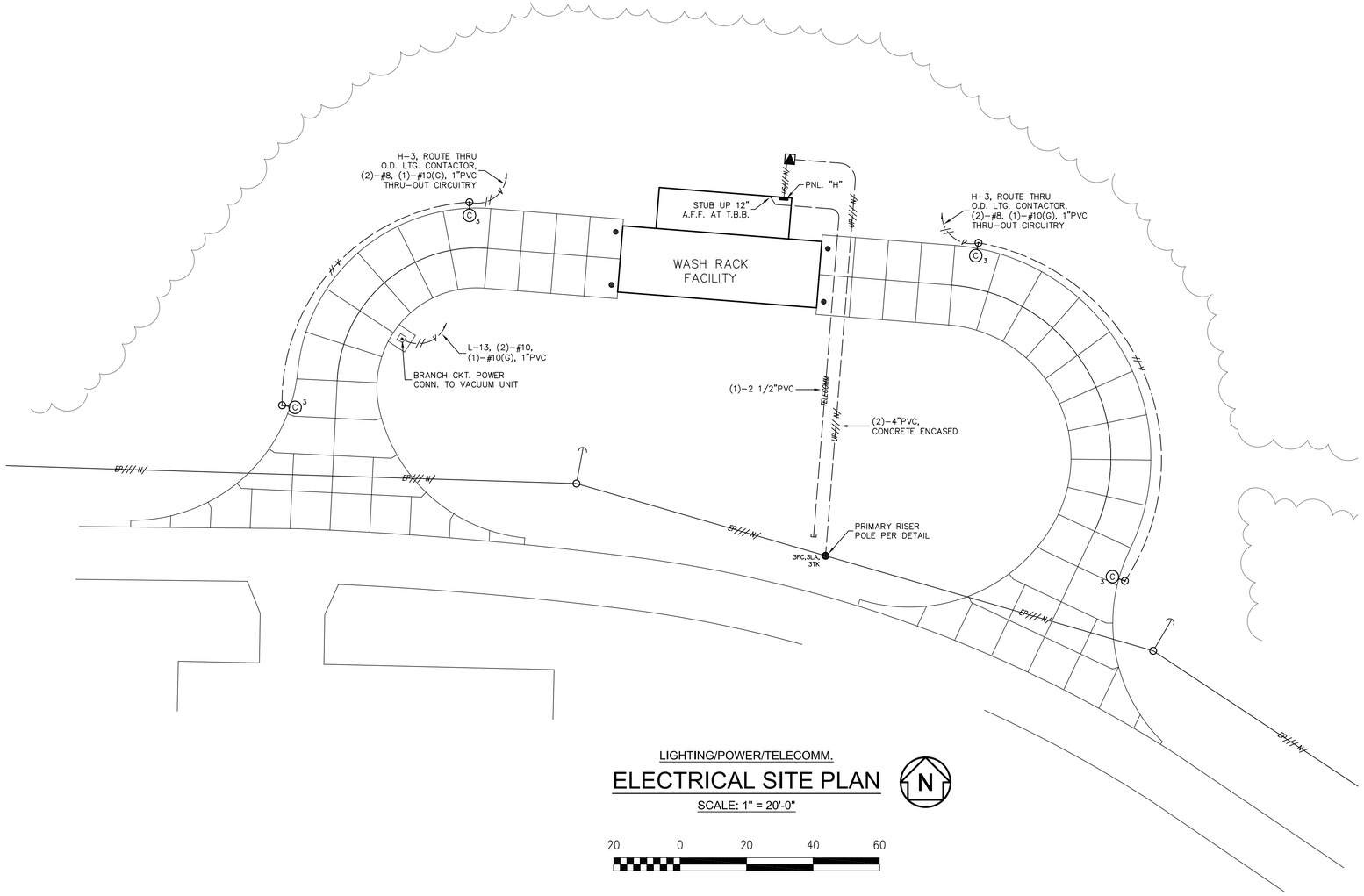
VOLTS	SYMBOL	WATTS	DESCRIPTION (NOTE 2)	MANUFACTURER	CAT. NO.	MOUNTING
277	A	(2)–32	INDUSTRIAL FLUORESCENT, 48", VAPORTIGHT, WET LOCATION LISTED, ELECTRONIC BALLAST (THD<10%), NON–METALLIC HOUSING, CHAIN HANGERS, NOTE 1	LITHONIA LTG.	DMW–232–AR–GEB–HC	SUSPEND TO 12'–0" A.F.F.
277	B	(1)–250	OUTDOOR HID WALL BRACKET, HPS, TYPE 3 – FULL CUTOFF DISTR., DIE CAST ALUMINUM HOUSING, DARK BRONZE FINISH	KIM LTG.	WD18D3/250HPS/DB–P	EXT. WALL C.L. 16'–0" A.F.F.
277	C	(1)–400	OUTDOOR HID STANDARD, HPS, SHOEBOX, TYPE 3, FULL CUTOFF DISTR., WITH 25', 7 GA. 5" SQUARE STRAIGHT STEEL POLE, DARK BRONZE FINISH	LITHONIA LTG.	KSF2–400S–R3–SSS255C	POLE BASE PER DETAIL

LIGHTING FIXTURE SCHEDULE NOTES:

1. LIGHTING FIXTURE SYMBOLS SHOWN "HATCHED" ON FLOOR PLAN DRAWINGS SHALL BE PROVIDED WITH INTEGRAL EMERGENCY BATTERY PACK EQUAL TO BODINE B50 SERIES. BATTERY PACK SHALL BE CONNECTED TO "NON–SWITCHED" LEG OF SAME BRANCH CIRCUIT SERVING LAMPS.
2. MANUFACTURER AND CATALOG NUMBERS LISTED ARE TO ESTABLISH THE TYPE AND QUALITY OF EACH FIXTURE. EQUAL LIGHTING FIXTURES MANUFACTURED BY DAY–BRITE, COLUMBIA, METALUX OR OTHER APPROVED MANUFACTURERS MAY BE PROVIDED.

ELECTRICAL SYMBOLS LEGEND

———//V//	BRANCH CIRCUIT (CONDUIT AND WIRING) CONCEALED ABOVE CEILING OR IN WALL, NUMBER OF CONDUCTORS. (—V—) INDICATES GREEN GROUNDING CONDUCTOR SIZED PER BRANCH CIRCUIT UNLESS OTHERWISE NOTED.
———//V———	BRANCH CIRCUIT (CONDUIT AND WIRING) CONCEALED IN/UNDER FLOOR SLAB PER THE SPECIFICATIONS OR BELOW GRADE PER THE SPECIFICATIONS, NUMBER OF CONDUCTORS.
- - -//V- - -	BRANCH CIRCUIT (CONDUIT AND WIRING) EXPOSED ON CEILING ONLY, NUMBER OF CONDUCTORS.
———//V———	BRANCH CIRCUIT (CONDUIT AND WIRING) EXPOSED IN FLEXIBLE METALLIC CONDUIT, NUMBER CONDUCTORS.
———L———	BRANCH CIRCUIT (CONDUIT AND WIRING) EXPOSED IN LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT WITH PROPER LIQUID–TIGHT FITTINGS, NUMBER OF CONDUCTORS.
4 1 2 3	BRANCH CIRCUIT (S) HOME RUN, PANEL AND CIRCUIT DESIGNATION, NUMBER OF CONDUCTORS, MINIMUM 3/4" CONDUIT UNLESS NOTED OTHERWISE ON THE PLANS OR IN THE SPECIFICATIONS. ALL HOMERUNS GREATER THAN 50 FEET IN LENGTH SHALL USE #10 AWG CONDUCTORS MINIMUM.
	SURFACE JUNCTION BOX, 4"X4"X4" UNLESS OTHERWISE NOTED, LOCATION SHOWN APPROXIMATE & REPRESENTATIVE, VERIFY EXACT LOCATION & MOUNTING HEIGHT WITH WASH EQUIPMENT PROVIDER PRIOR TO ROUGH–IN.
A A1	LIGHTING FIXTURE OUTLET WITH FIXTURE PER LIGHTING FIXTURE SCHEDULE, FIXTURE SYMBOL, CIRCUIT NUMBER(S), MOUNTING PER THE LIGHTING FIXTURE SCHEDULE.
B B2	LIGHTING FIXTURE WALL BRACKET OUTLET WITH FIXTURE, FIXTURE SYMBOL, CIRCUIT NUMBER(S), MOUNTING PER THE LIGHTING FIXTURE SCHEDULE.
C C3	FLUORESCENT FIXTURE OUTLET WITH FIXTURE PER LIGHTING FIXTURE SCHEDULE, FIXTURE SYMBOL, CIRCUIT NUMBER(S), MOUNTING PER THE LIGHTING FIXTURE SCHEDULE.
	HATCH LINES THRU ANY LIGHTING FIXTURE SYMBOL DENOTES FIXTURE WITH INTEGRAL EMERGENCY BATTERY PACK PER THE SPECIFICATIONS.
F F6	OUTDOOR AREA LIGHTING FIXTURE WITH POLE AND BASE, FIXTURE SYMBOL PER LIGHTING FIXTURE SCHEDULE, SEE POLE BASE DETAIL FOR ADDITIONAL REQUIREMENTS, CIRCUIT NUMBER.
S	SWITCH WITH BOX & PLATE, 20A1P TOGGLE, FLUSH MOUNT C.L. UP 48" A.F.F. UNLESS NOTED OTHERWISE.
S3	SWITCH WITH BOX & PLATE, 20A1P TOGGLE, THREE–WAY, FLUSH MOUNT C.L. UP 48" A.F.F. UNLESS NOTED OTHERWISE.
S4	SWITCH WITH BOX & PLATE, 20A1P TOGGLE, FOUR–WAY, FLUSH MOUNT C.L. UP 48" A.F.F. UNLESS NOTE OTHERWISE.
SFRH	SWITCH, FUSED SAFETY DISCONNECT, NEMA 3R RATED, NUMBER OF POLES, AMPS, 480 VOLT, SURFACE MOUNT C.L. UP 54" A.F.F. UNLESS NOTED OTHERWISE.
	PHOTO–ELECTRIC CONTROL SENSING CELL, AIM TO NORTH.
TS	TIME SWITCH, ELECTRONIC, SURFACE MOUNT C.L. 54" A.F.F. UNLESS NOTED OTHERWISE.
C	MAGNETIC CONTACTOR, NUMBER OF POLES, AMPS, SURFACE MOUNT C.L. UP 54" A.F.F. UNLESS NOTED OTHERWISE.
WP	BY ANY SYMBOL DENOTES DEVICE AND INSTALLATION TO BE WEATHER PROOF.
3	DUPLEX GROUNDING RECEPTACLE WITH BOX & "IN–USE" WEATHERPROOF COVER, G.F.I. TYPE, 120 VOLTS, NEMA 5–20R, MOUNT C.L. UP 18" A.F.F. UNLESS NOTED OTHERWISE, CIRCUIT NUMBER.
	ELECTRICAL SERVICE CONNECTION TO EQUIPMENT, PROVIDE & CONNECT THRU DISCONNECT SWITCH AS INDICATED ADJACENT TO UNIT, LOCATION SHOWN APPROXIMATE & REPRESENTATIVE, FINAL CONNECTION SHALL BE LIQUID–TIGHT METALLIC FLEXIBLE CONDUIT.
F	ELECTRICAL SERVICE CONNECTION TO EXHAUST FAN, CONNECT THRU INTEGRAL DISCONNECT SWITCH LOCATION SHOWN APPROXIMATE & REPRESENTATIVE, FINAL CONNECTION USING FLEXIBLE CONDUIT.
	BRANCH CIRCUIT PANELBOARD, SURFACE MOUNT, 208Y/120 VOLT SYSTEM.
	BRANCH CIRCUIT PANELBOARD, SERVICE ENTRANCE RATED, SURFACE MOUNT, 480Y/277 VOLT SYSTEM.
T	TRANSFORMER, DRY–TYPE, WALL MOUNT BOTTOM AT 10'–0" A.F.F., KVA RATING.
	TRANSFORMER, PAD MOUNTED, KVA, WITH CONCRETE PAD PER DETAIL.
M	METER SOCKET AND METER, FURNISHED AND INSTALLED BY THE DIVISION 16 CONTRACTOR.
EP///N/	CONDUCTORS, EXISTING, PRIMARY, OVERHEAD, NUMBER OF CONDUCTORS PRIMARY (EP) & NEUTRAL (N), LOCATION & ROUTING SHOWN IS APPROXIMATE & REPRESENTATIVE.
UP///N/	DUCT BANK & CONDUCTORS, PRIMARY, UNDERGROUND, SIZE, TYPE & NUMBER OF CONDUCTORS PRIMARY (UP) & NEUTRAL (N), CONDUIT SIZES AS NOTED, CONCRETE ENCASED PER DETAIL.
US///N/	DUCT BANK & CONDUCTORS, SECONDARY, UNDERGROUND, SIZE, TYPE, & NUMBER OF CONDUCTORS SECONDARY (US) & NEUTRAL (N),
45/3	POLE, LENGTH AND CLASS.
45/3	POLE, EXISTING, LENGTH AND CLASS.
3FC(10)	CUT–OUT SWITCH, PRIMARY, FUSED, NUMBER REQUIRED, (10) INDICATES FUSE SIZE.
3LA	LIGHTNING ARRESTER, PRIMARY, NUMBER REQUIRED
3TK	TERMINATION KIT, PRIMARY, NUMBER REQUIRED.
	TELECOMMUNICATION SYSTEM BACKBOARD, SIZE AS NOTED, 3/4" PLYWOOD, LONG DIMENSION VERTICAL, TERMINATE ALL VOICE/DATA HOMERUNS AT THIS POINT AND BUSH.
▽	TELECOMMUNICATION SYSTEM VOICE OUTLET & PLATE, 4" SQUARE BOX WITH PROPER DEPTH 1 GANG RAISED COVER, 3/4" OR SIZE AS NOTED CONDUIT HOMERUN TO TELECOMMUNICATION BACKBOARD, MOUNT C.L. UP 48" A.F.F. UNLESS NOTED OTHERWISE.
T–(1)–3/4"	TELECOMMUNICATION SYSTEM CONDUIT, ROUTE CONCEALED OR EXPOSED PER BRANCH CIRCUIT SYMBOL, (*) INDICATES NUMBER OF 4PR, CAT. 3 CABLES, CONDUIT SIZE.
(1)–3/4"	TELECOMMUNICATION SYSTEM HOMERUN TO TELECOMMUNICATION SYSTEM BACKBOARD, ROUTE CONCEALED OR EXPOSED PER THE BRANCH CIRCUIT SYMBOL, (*) INDICATES NUBER OF 4PR, CAT. 3 CABLES, CONDUIT SIZE.



LIGHTING/POWER/TELECOMM.

ELECTRICAL SITE PLAN

SCALE: 1" = 20'-0"

20 0 20 40 60

JH&H JOB: 04103

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SUPV JMW CH ENGR
SUBMITTED BY (FIRM MEMBER–TITLE): DATE 06/24/05
TECHNICAL BRANCH
PPE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

STENNIS SPACE CENTER

SBT–22 WASHRACK FACILITY

ELEC. SITE PLAN & SCHEDULES

DATE

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

EFD FOR COMMANDER, NAVFAC

JOHN M. WYNNE REGISTERED PROFESSIONAL ENGINEER #11869 STATE OF MISSISSIPPI

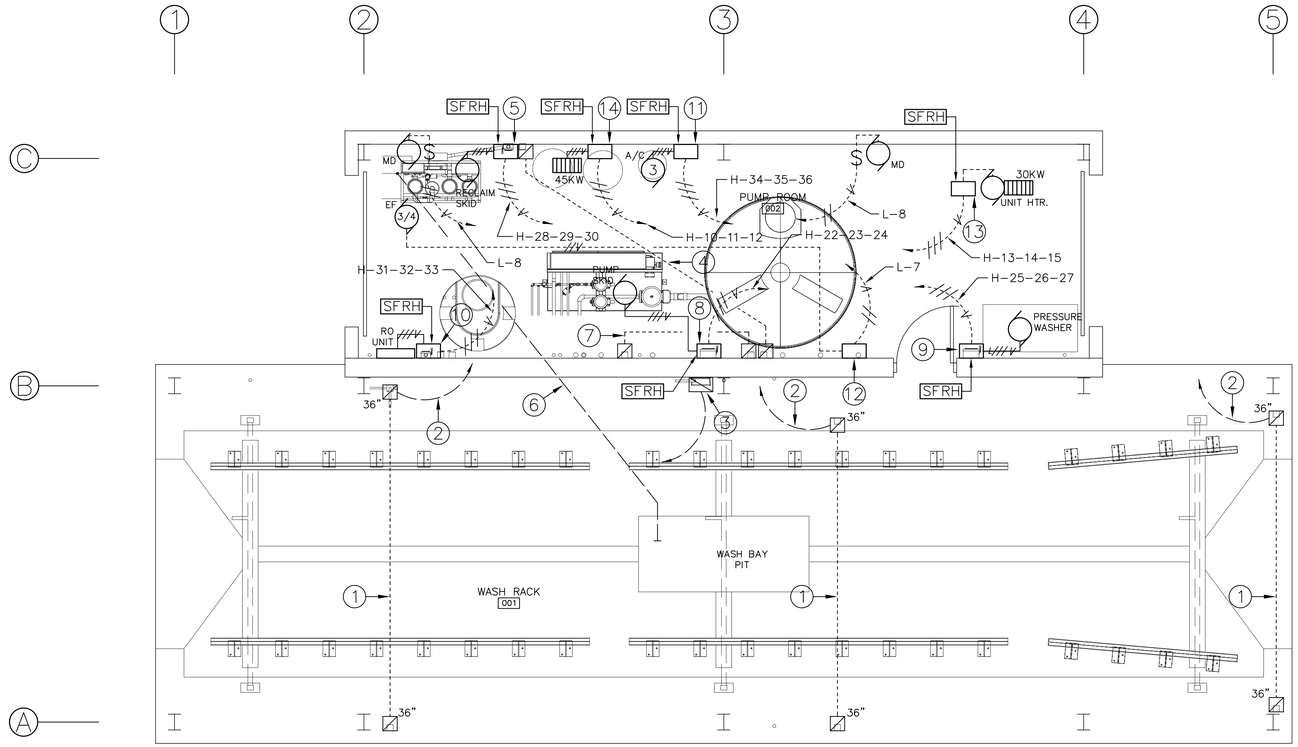
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CONSTRN. CONTR. NO.	
NAVFAC DRAWING NO.	
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W/O JOB NO: 205067

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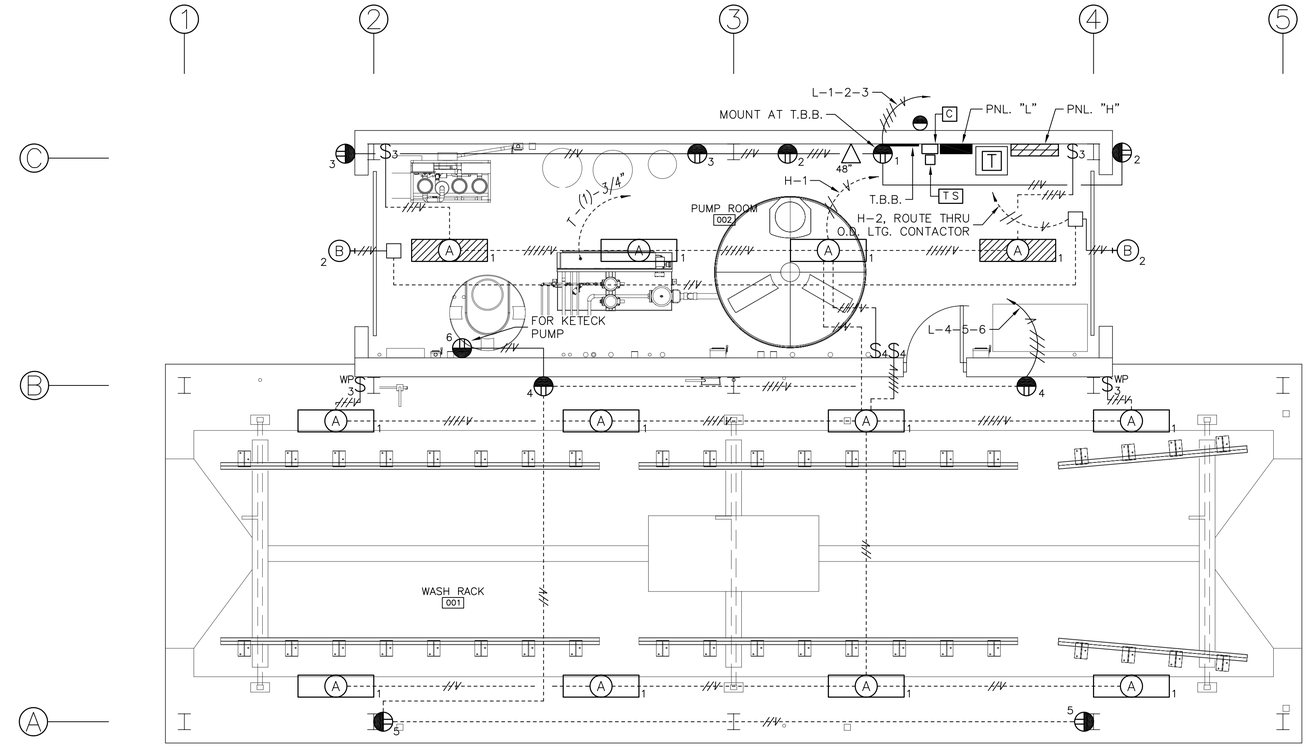
EQUIPMENT CONNECTIONS FLOOR PLAN NOTES:

1. 3/4" GRS CONDUIT WITH (3)–#14 AWG CONDUCTORS. LEAVE A MINIMUM OF 36" OF SLACK CONDUCTORS AT EACH END FOR TERMINATIONS BY WASH EQUIPMENT PROVIDER.
2. 3/4" GRS CONDUIT WITH (3)–#14 AWG CONDUCTORS & (2)–BELDEN 8723 CABLES. ROUTE TO PUMP SKID PANEL. ENTER PANEL THRU BOTTOM. LEAVE A MINIMUM OF 36" OF SLACK CONDUCTORS AT EACH END FOR TERMINATIONS BY WASH EQUIPMENT PROVIDER.
3. JUNCTION BOX, 12"X12"X4", SURFACE MOUNT C.L. 17'–0" A.F.F. PROVIDE 1 1/2" GRS CONDUIT WITH (9)–#10 AWG & (1)–#10 (G) CONDUCTORS ROUTED TO PUMP SKID PANEL. ENTER PANEL THRU BOTTOM. LEAVE A MINIMUM OF 36" OF SLACK CONDUCTORS AT EACH END FOR TERMINATIONS BY WASH EQUIPMENT PROVIDER.
4. 3/4" GRS CONDUIT WITH (4)–#14 AWG CONDUCTORS. LEAVE A MINIMUM OF 36" OF SLACK CONDUCTORS AT EACH END FOR TERMINATIONS BY WASH EQUIPMENT PROVIDER.
5. POWER CONNECTION TO RECLAIM SKID. 30A3P H.D. FUSIBLE DISCONNECT SWITCH. (3)–#10, (1)–#10(G), 3/4"GRS BRANCH CIRCUIT. PROVIDE FUSES AS REQUIRED BY WASH EQUIPMENT PROVIDER.
6. PROVIDE 2" PVC CONDUIT (SCHEDULE 80) W/PULL STRING FROM WASH BAY PIT TO RECLAIM SKID. VERIFY STUB UP LOCATIONS AT EACH END WITH WASH EQUIPMENT PROVIDER PRIOR TO ROUGH–IN.
7. 3/4" GRS CONDUIT WITH (3)–#14 AWG CONDUCTORS. LEAVE A MINIMUM OF 36" OF SLACK CONDUCTORS AT EACH END FOR TERMINATIONS BY WASH EQUIPMENT PROVIDER.
8. POWER CONNECTION TO PUMP SKID. 100A3P H.D. FUSIBLE DISCONNECT SWITCH. (3)–#2, (1)–#6(G), 1 1/4"GRS BRANCH CIRCUIT. PROVIDE FUSES AS REQUIRED BY WASH EQUIPMENT PROVIDER. CONNECTION TO PUMP SKID PANEL SHALL ENTER THRU BOTTOM OF PANEL.
9. POWER CONNECTION TO PRESSURE WASHER. 60A3P H.D. FUSIBLE DISCONNECT SWITCH. (3)–#6, (1)–#10(G), 1"GRS BRANCH CIRCUIT. PROVIDE FUSES AS REQUIRED BY WASH EQUIPMENT PROVIDER.
10. POWER CONNECTION TO RO SKID. 30A3P H.D. FUSIBLE DISCONNECT SWITCH. (3)–#10, (1)–#10(G), 3/4"GRS BRANCH CIRCUIT. PROVIDE FUSES AS REQUIRED BY WASH EQUIPMENT PROVIDER.
11. POWER CONNECTION TO AIR COMPRESSOR. 30A3P H.D. FUSIBLE DISCONNECT SWITCH. (3)–#10, (1)–#10(G), 3/4"GRS BRANCH CIRCUIT. FUSE AT 20A.
12. FAN F–1 MOTOR STARTER. FURNISHED BY DIV. 15 CONTRACTOR & INSTALLED & CONNECTED BY THE DIV. 16 CONTRACTOR.
13. POWER CONNECTION TO UNIT HEATER. 60A3P H.D. NON–FUSIBLE DISCONNECT SWITCH. (3)–#6, (1)–#10(G), 1"GRS BRANCH CIRCUIT.
14. POWER CONNECTION TO WATER HEATER. 100A3P H.D. NON–FUSIBLE DISCONNECT SWITCH. (3)–#4, (1)–#4(G), 1 1/4"GRS BRANCH CIRCUIT.

EQUIPMENT POWER

ELECTRICAL FLOOR PLAN

SCALE: 1/4" = 1'-0"



LIGHTING/POWER/TELECOMM.

ELECTRICAL FLOOR PLAN

SCALE: 1/4" = 1'-0"

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DSGN	JMW	DR	JMW	CH	JMW
SUPV	JMW	CH ENGR			

SUBMITTED BY (FIRM MEMBER–TITLE): 06/24/05

TECHNICAL BRANCH

PE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

SBT–22 WASHRACK FACILITY

ELECTRICAL FLOOR PLAN

DATE

EFD FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

JOHN M. WYNNE
REGISTERED PROFESSIONAL ENGINEER
#11869
STATE OF MISSISSIPPI

RECORD DRAWING DATE

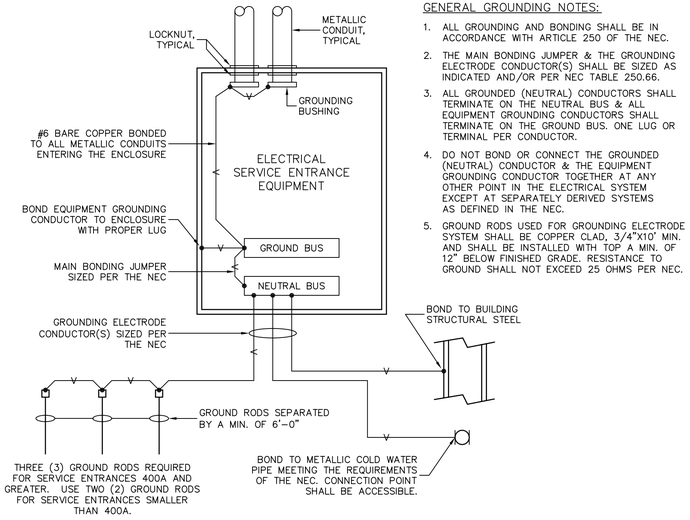
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SHEET	OF

W/O JOB NO: 205067

E2.1

JH&H JOB: 04103

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SERVICE ENTRANCE

GROUNDING/BONDING DETAIL

NO SCALE

GENERAL GROUNDING NOTES:

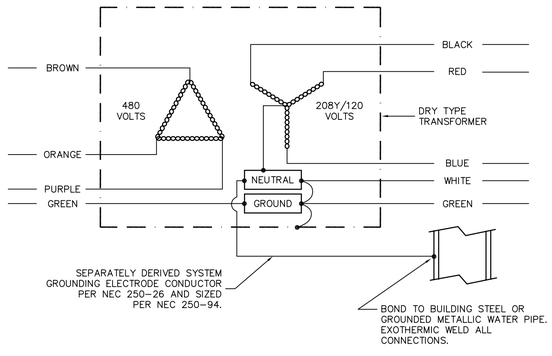
1. ALL GROUNDING AND BONDING SHALL BE IN ACCORDANCE WITH ARTICLE 250 OF THE NEC.
2. THE MAIN BONDING JUMPER & THE GROUNDING ELECTRODE CONDUCTOR(S) SHALL BE SIZED AS INDICATED AND/OR PER NEC TABLE 250.66.
3. ALL GROUNDED (NEUTRAL) CONDUCTORS SHALL TERMINATE ON THE NEUTRAL BUS & ALL EQUIPMENT GROUNDING CONDUCTORS SHALL TERMINATE ON THE GROUND BUS. ONE LUG OR TERMINAL PER CONDUCTOR.
4. DO NOT BOND OR CONNECT THE GROUNDED (NEUTRAL) CONDUCTOR & THE EQUIPMENT GROUNDING CONDUCTOR TOGETHER AT ANY OTHER POINT IN THE ELECTRICAL SYSTEM EXCEPT AT SEPARATELY DERIVED SYSTEMS AS DEFINED IN THE NEC.
5. GROUND RODS USED FOR GROUNDING ELECTRODE SYSTEM SHALL BE COPPER CLAD, 3/4"X10' MIN. AND SHALL BE INSTALLED WITH TOP A MIN. OF 12" BELOW FINISHED GRADE. RESISTANCE TO GROUND SHALL NOT EXCEED 25 OHMS PER NEC.

PANELBOARD "H" — VOLTS: 480Y/277, PHASE: 3 WIRE: 4, MIN. K.A.I.C.: 14, MAIN BRKR.: 400A3P — MAIN BUS: 400A, NEUT. BUS: 400A, WITH GROUND BUS, MOUNTING: SURFACE

CKT.	LOAD DESCRIPTION L	R	TYPE	ROOM	BREAKER AMP	POLE	PH.	BREAKER POLE	AMP	LOAD DESCRIPTION ROOM	TYPE	R	L	CKT.
1	X		I.D. LTG.		20	1	A	3	100		PUMP SKID			22
2	X		O.D. LTG.		20	1	B							23
3	X		O.D. LTG.		20	1	C							24
4			SPARE		20	1	A	3	60		PRESSURE			25
5			SPARE		20	1	B				WASHER			26
6			SPARE		20	1	C							27
7			PNL "L"		30	3	A	3	30		RECLAIM			28
8							B				SKID			29
9							C							30
10			WTR. HTR.		70	3	A	3	30		RO SKID			31
11							B							32
12							C							33
13			UNIT HTR.		50	3	A	3	20		AIR			34
14							B				COMPRESSOR			35
15							C							36
16			SPACE		20	1	A	3	30		SPARE			37
17					20	1	B							38
18					20	1	C							39
19					20	1	A	3	60		SPARE			40
20					20	1	B							41
21					20	1	C							42

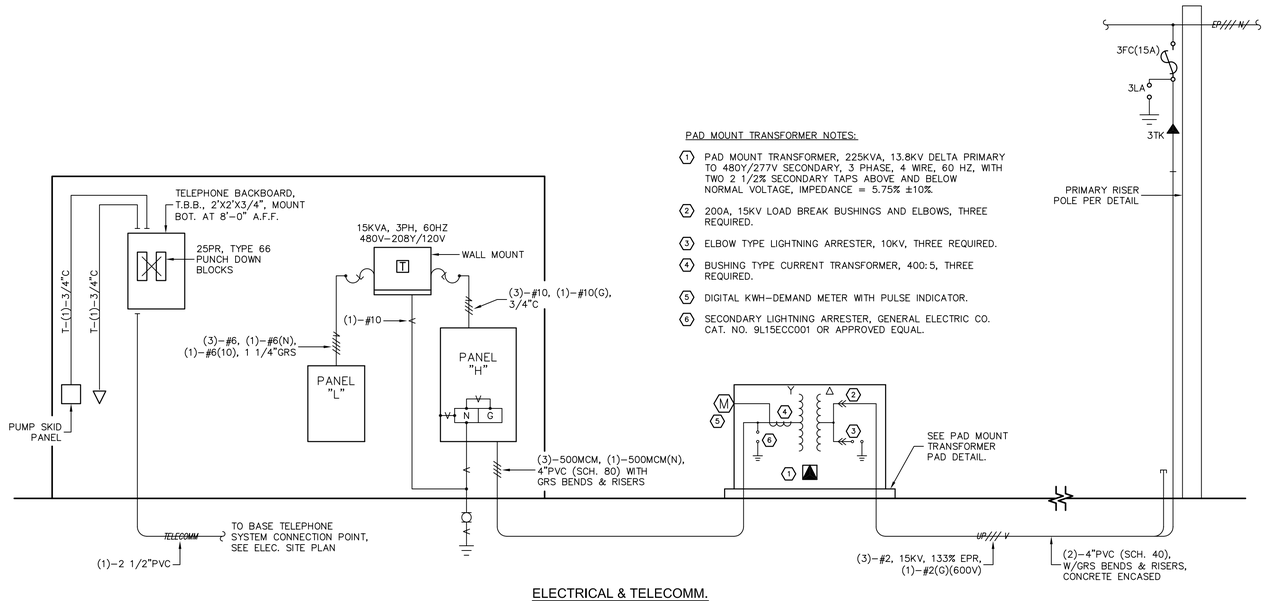
PANELBOARD "L" — VOLTS: 208Y/120, PHASE: 3 WIRE: 4, MIN. K.A.I.C.: 10, MAIN BRKR.: 60A3P — MAIN BUS: 125A, NEUT. BUS: 125A, WITH GROUND BUS, MOUNTING: SURFACE

CKT.	LOAD DESCRIPTION L	R	TYPE	ROOM	BREAKER AMP	POLE	PH.	BREAKER POLE	AMP	LOAD DESCRIPTION ROOM	TYPE	R	L	CKT.
1		X			20	1	A	1	30		VACUUM			13
2		X			20	1	B	1	20		SPACE			14
3		X			20	1	C	1	20					15
4		X			20	1	A	1	20					16
5		X			20	1	B	1	20					17
6		X	PUMP		20	1	C	1	20					18
7			EXH. FAN		20	1	A	1	20					19
8			DAMPERS		20	1	B	1	20					20
9			SPARE		20	1	C	1	20					21
10					20	1	A	1	20					22
11					20	1	B	1	20					23
12					20	1	C	1	20					24



DRY TYPE TRANSFORMER WIRING DIAGRAM

NO SCALE



PAD MOUNT TRANSFORMER NOTES:

1. PAD MOUNT TRANSFORMER, 225KVA, 13.8KV DELTA PRIMARY TO 480Y/277V SECONDARY, 3 PHASE, 4 WIRE, 60 HZ, WITH TWO 2 1/2% SECONDARY TAPS ABOVE AND BELOW NORMAL VOLTAGE, IMPEDANCE = 5.75% ±10%.
2. 200A, 15KV LOAD BREAK BUSHINGS AND ELBOWS, THREE REQUIRED.
3. ELBOW TYPE LIGHTNING ARRESTER, 10KV, THREE REQUIRED.
4. BUSHING TYPE CURRENT TRANSFORMER, 400:5, THREE REQUIRED.
5. DIGITAL KWH-DEMAND METER WITH PULSE INDICATOR.
6. SECONDARY LIGHTNING ARRESTER, GENERAL ELECTRIC CO. CAT. NO. 9L15ECC001 OR APPROVED EQUAL.

ELECTRICAL & TELECOMM.

SCHEMATIC RISER DIAGRAM

NO SCALE

ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST.
JACKSON, MS 39202
601-355-4601
601-355-4601 (F)
DSGN JMW DR JMW CHK JMW
SUPV CH ENGR
SUBMITTED BY (FIRM MEMBER--TITLE): DATE 06/24/05
TECHNICAL BRANCH
PPE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

SBT-22 WASHRACK FACILITY

ELECTRICAL RISERS & DETAILS

DATE — EFD FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

JOHN M. WYNNE REGISTERED PROFESSIONAL ENGINEER #11869 STATE OF MISSISSIPPI

RECORD DRAWING DATE

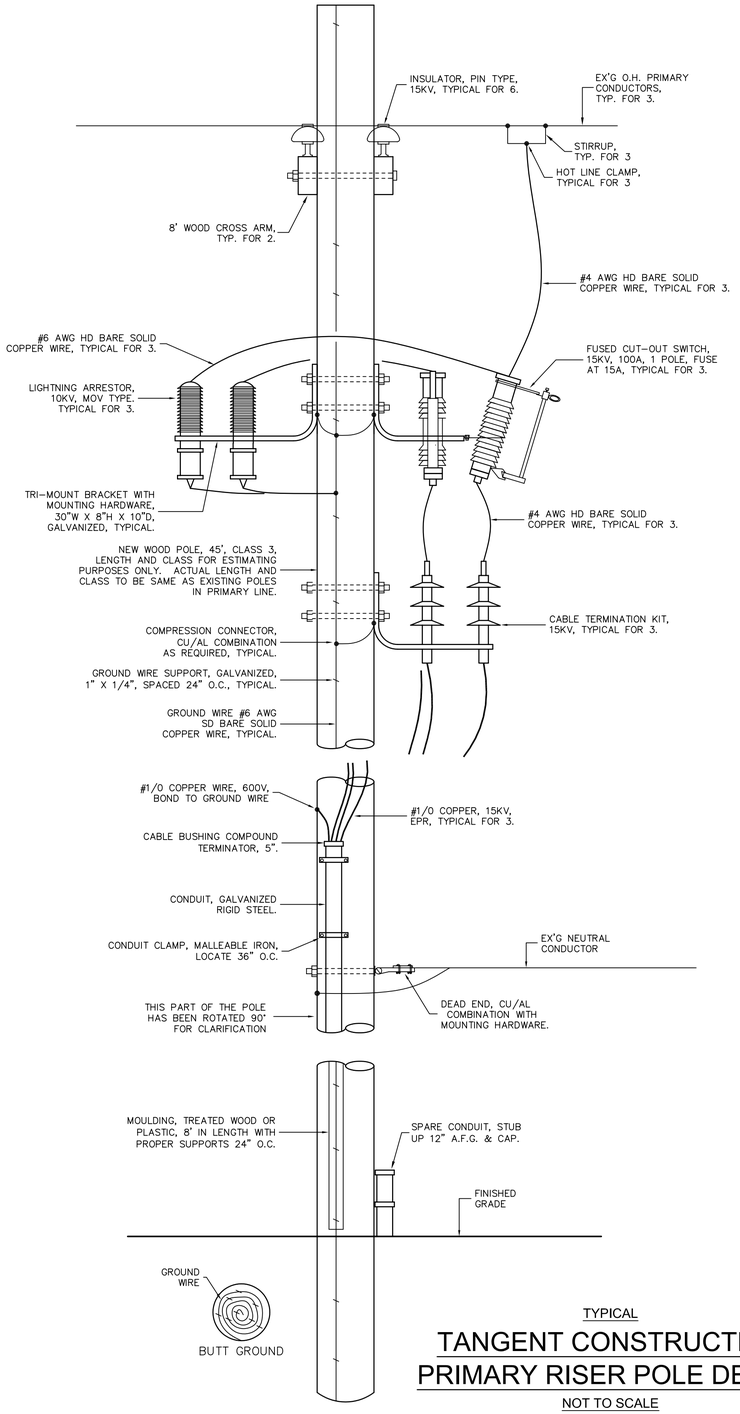
CODE I.D. NO.	80091
DRAWING SIZE:	D
SPEC. NO..	
CONSTRN. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET	OF

W/O JOB NO: 205067

E3.1

JH&H JOB: 04103

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TYPICAL

TANGENT CONSTRUCTION PRIMARY RISER POLE DETAIL

NOT TO SCALE

GENERAL DUCT BANK NOTES:

CONDUITS, SIZES AS NOTED ON THE PLANS, SHALL BE SCHEDULE 40 PVC UNLESS OTHERWISE NOTED ON THE PLANS. ALL BENDS SHALL BE LONG RADIUS, GALVANIZED RIGID STEEL (GRS) CONDUIT. CONVERT TO GRS CONDUIT FOR ALL VERTICAL RISERS.

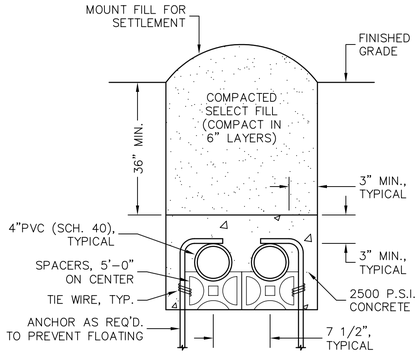
MINIMUM SPACING FROM CENTER TO CENTER OF CONDUITS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

PROVIDE MARKER TAPE 12" BELOW FINISHED GRADE. CONDUITS SHALL BE A MINIMUM OF 36" BELOW FINISHED GRADE.

BACKFILL ABOVE THE DUCTBANK SHALL BE SELECT FILL & COMPACTED IN 6" LAYERS. MOUND FILL ABOVE FINISHED GRADE FOR SETTLEMENT.

PROVIDE A MINIMUM OF 24" SEPARATION BETWEEN ALL COMMUNICATIONS CONDUITS AND THE NEAREST POWER CONDUITS. MEASUREMENT TO BE MADE BETWEEN OUTSIDE WALLS OF CONDUITS.

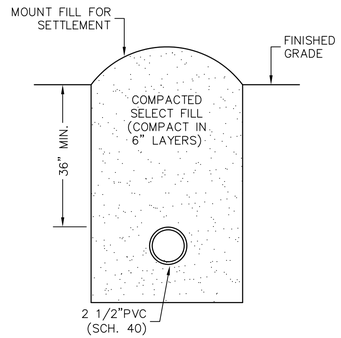
ALL EMPTY DUCT BANK CONDUITS TO HAVE NYLON PULL CORDS INSTALLED.



TYPICAL - SECTION THRU

ELEC. PRIMARY DUCT BANK

NO SCALE



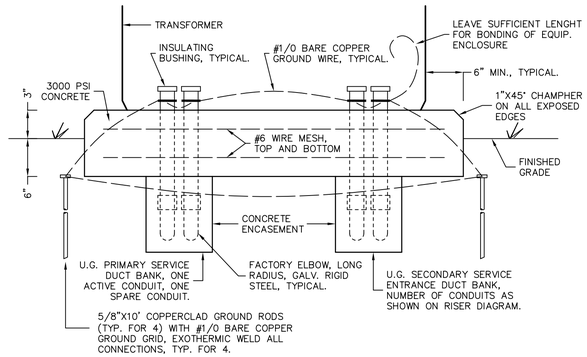
TYPICAL - SECTION THRU

TELECOMM. SERVICE ENTRANCE DUCT BANK

NO SCALE

GENERAL NOTE:

DIMENSIONS ARE FOR ESTIMATING PURPOSES ONLY. VERIFY ALL DIMENSIONS AND INSTALL TO SATISFY TRANSFORMER OR UTILITY COMPANY REQUIREMENTS.



PAD-MOUNTED TRANSFORMER

TYPICAL PAD DETAIL

NO SCALE

CIRCUITRY NOTE:

BRANCH CIRCUIT HOMERUNS ARE SHOWN TO IDENTIFY CIRCUITRY. CONDUITS AND/OR NUMBER OF CONDUCTORS ARE SHOWN FOR HOMERUNS AND SPECIAL CIRCUITRY ONLY. CONDUITS ARE SHOWN FOR LIGHTING CIRCUITS TO INDICATE SWITCHING. NORMAL BRANCH CIRCUIT CONDUCTORS TO BE DETERMINED AS FOLLOWS:

- ONE CONDUCTOR FOR EACH PHASE.
- ONE CONDUCTOR FOR EACH NEUTRAL.
- ONE CONDUCTOR FOR EACH SWITCHLEG.
- ONE CONDUCTOR FOR EACH GROUND.
- ONE CONDUCTOR FOR EACH BATTERY CHARGER ON APPLICABLE FIXTURES.
- TWO CONDUCTORS FOR THREE- AND FOUR-WAY SWITCHING

ALL BRANCH CIRCUITS SHALL CONTAIN GROUND WIRE.

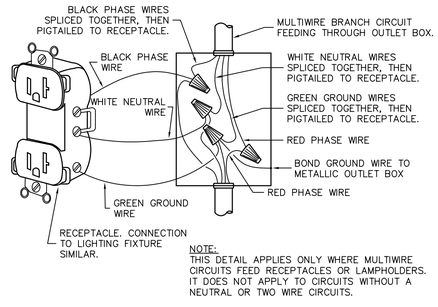
ALL SHARED NEUTRAL CONDUCTORS SERVING RECEPTACLE BRANCH CIRCUITS SHALL BE MINIMUM #10 AWG.

ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS SPECIFICALLY NOTED AND/OR SHOWN BY SYMBOLS ON THE DRAWINGS OTHERWISE.

BRANCH CIRCUIT(S) FOR EACH FIXTURE/DEVICE SHALL BE DETERMINED FROM CIRCUIT NUMBER AND PANEL DESIGNATION SHOWN AT EACH SYMBOL.

A (2) — CIRCUIT NUMBER

(3) — CIRCUIT NUMBER

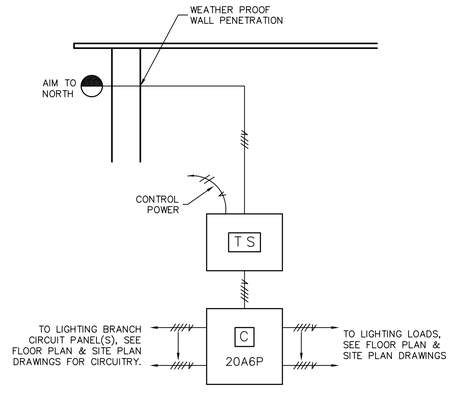


NOTE:
THIS DETAIL APPLIES ONLY WHERE MULTIWIRE CIRCUITS FEED RECEPTACLES OR LAMPHOLDERS. IT DOES NOT APPLY TO CIRCUITS WITHOUT A NEUTRAL OR TWO WIRE CIRCUITS.

TYPICAL MULTIWIRE BRANCH CIRCUIT

CONNECTION DIAGRAM

NOT TO SCALE



OUTDOOR LIGHTING

CONTROL RISER DIAGRAM

NO SCALE

ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST.
JACKSON, MS 39202
601-355-4601 (f) 601-355-4601
DSGN JMW DR JMW CHK JMW
SUPV JMW CH ENGR
SUBMITTED BY (FIRM MEMBER-TITLE): DATE 06/24/05
TECHNICAL BRANCH
PPE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

STENNIS SPACE CENTER, MISSISSIPPI

SBT-22 WASHRACK FACILITY

ELECTRICAL RISERS & DETAILS

DATE EFD FOR COMMANDER, NAVFAC

APPROVED

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

JOHN M. WYNNE
REGISTERED PROFESSIONAL ENGINEER
#11869
STATE OF MISSISSIPPI

RECORD DRAWING DATE

CODE I.D. NO.	80091
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SPEC. NO..	
CONSTRN. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET	OF .

E3.2

W/O JOB NO: 205067

JH&H JOB: 04103

ATTACHMENT 10

WASH RACK FACILITY

Specifications

**(Division 01 Specifications have been removed.
Please refer to Part 2 Specifications in this RFP.)**

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-- End of Project Table of Contents --

SECTION 02231

CLEARING AND GRUBBING
09/03

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Nonsaleable Materials; G

Written permission to dispose of such products on private property shall be filed with the Contracting Officer.

1.2 DELIVERY, STORAGE, AND HANDLING

Deliver materials to, store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

2.1 TREE WOUND PAINT

Bituminous based paint of standard manufacture specially formulated for tree wounds.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting

Officer in ample time to minimize interruption of the service. Refer to Section 01310N, ADMINISTRATIVE REQUIREMENTS and Section 01575N, TEMPORARY ENVIRONMENTAL CONTROLS for additional utility protection.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint.

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 PRUNING

Prune trees designated to be left standing within the cleared areas of dead branches 1 1/2 inches or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1 1/4 inches in diameter with an approved tree wound paint.

3.5 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.6 DISPOSAL OF MATERIALS

3.6.1 Nonsaleable Materials

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, except for salable timber, shall be disposed of outside the limits of Government-controlled land at the Contractor's responsibility, except when otherwise directed in writing. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed.

-- End of Section --

SECTION 02300

EARTHWORK
08/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and

	Plasticity Index of Soils
ASTM D 698	(2000a) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 MEASUREMENT

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, CL-ML. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 3 inches in any dimension.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. The Contracting Officer shall be notified of any contaminated materials.

1.3.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.3.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve shall be expressed as a percentage of the maximum density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224. To maintain the same percentage of coarse material, the "remove and replace" procedure as described in the NOTE 8 in Paragraph 7.2 of AASHTO T 180 shall be used.

1.3.5 Topsoil

Material suitable for topsoils obtained from offsite areas or excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5

to 7.

1.3.6 Hard/Unyielding Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.3.7 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.3.8 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.3.9 Select Granular Material

1.3.9.1 General Requirements

Select granular material shall consist of materials classified as GW, GP, SW, SP, or by ASTM D 2487. The liquid limit of such material shall not exceed 35 percent when tested in accordance with ASTM D 4318. The plasticity index shall not be greater than 8 percent when tested in accordance with ASTM D 4318, and not more than 18 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

1.3.10 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 1 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.3.11 Select Fill

Select Fill shall be free of organic or other deleterious materials having a maximum particle size of one inch with a liquid limit less than 35 and a plasticity index more than 8 and less than 18.

1.3.12 Expansive Soils

Expansive soils are defined as soils that have a plasticity index equal to or greater than 35 when tested in accordance with ASTM D 4318.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Submit 15 days prior to starting work.

SD-06 Test Reports

Testing
Borrow Site Testing

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

1.5 SUBSURFACE DATA

The subsoil investigation report and samples of materials taken from subsurface investigations may be examined. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.6 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.7 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Material character is indicated by the boring logs.

d. Hard materials and rock will not be encountered.

1.8 DEWATERING WORK PLAN

Submit procedures for accomplishing dewatering work.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and

alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Yellow:	Electric
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems

2.1.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.1.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, topsoil shall be stripped to a depth of 4 inches. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from excavations and grading shall be removed from the site.

3.2 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with

the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 4 feet from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.3 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material.

3.2.4 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 5 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 4 feet high shall be shored. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.2.4.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.2.4.2 Removal of Unyielding Material

Where overdepth is not indicated and unyielding material is encountered in the bottom of the trench, such material shall be removed 4 inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.4.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.2.4.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.2.5 Underground Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas from private sources. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling.

3.4 OPENING AND DRAINAGE OF EXCAVATION

Except as otherwise permitted, excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed.

3.5 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Excavation to final grade shall not be made until just before concrete is to be placed. Only excavation methods that will leave the foundation rock in a solid and unshattered condition shall be used. Approximately level surfaces shall be roughened, and sloped surfaces shall be cut as indicated into rough steps or benches to provide a satisfactory bond. Shales shall be protected from slaking and all surfaces shall be protected from erosion resulting from ponding or flow of water.

3.6 GROUND SURFACE PREPARATION

3.6.1 General Requirements

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural

ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

3.6.2 Frozen Material

Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to plus or minus 3 percent of optimum moisture. Minimum subgrade density shall be as specified in paragraph TESTING.

3.7 EXCAVATED MATERIALS

Materials removed from excavations shall be disposed off-site.

3.8 BURIED TAPE AND DETECTION WIRE

3.8.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.8.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over it's entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.9 BACKFILLING AND COMPACTION

Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph PREPARATION OF GROUND SURFACE FOR EMBANKMENTS. Compaction requirements for backfill materials shall also conform to the applicable portions of paragraphs PREPARATION OF GROUND SURFACE FOR EMBANKMENTS, EMBANKMENTS, and SUBGRADE PREPARATION, and Section 02630 STORM DRAINAGE; and Section 02300 EARTHWORK. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.9.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 2 feet above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test.

3.9.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.9.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.

3.9.1.3 Bedding and Initial Backfill

Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:

a. Class II: Coarse sands and gravels with maximum particle size of 1.5 inches, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

3.9.1.4 Select Fill

The remainder of the trench, except for special materials for roadways, shall be filled with select fill. Backfill material shall be placed and compacted as follows:

a. Roadways: Backfill shall be placed up to the required elevation as specified. Water flooding or jetting methods of compaction will not be permitted.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12 inch loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.9.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 7 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.10 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.10.1 Water Lines

Trenches shall be of a depth to provide a minimum cover of 2.5 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.10.2 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

3.11 EMBANKMENTS

3.11.1 Earth Embankments

Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. The material shall be placed in successive horizontal layers of loose material not more than 9 inches in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.12 SUBGRADE PREPARATION

3.12.1 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade of the building and pavement areas with six passes of a dump truck loaded with 4 cubic yards of soil. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 1/2 to 3 1/2 mph. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Contracting Officer. Rutting or pumping of material shall be undercut as directed by the Contracting Officer and replaced with select material.

3.12.2 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with

satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 0.5 inch when tested with a 12 foot straightedge applied both parallel and at right angles to the centerline of the area. The elevation of the finish subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.12.3 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas each layer of the embankment shall be compacted to at least 85 percent of laboratory maximum density.

3.12.3.1 Subgrade for Pavements

Subgrade for pavements shall be compacted to at least 90 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, the top 6 inches of subgrade shall be scarified, windrowed, thoroughly blended, reshaped, and compacted.

3.12.3.2 Subgrade for Shoulders

Subgrade for shoulders shall be compacted to at least 90 percentage laboratory maximum density for the depth below the surface of shoulder shown.

3.13 SHOULDER CONSTRUCTION

Shoulders shall be constructed of satisfactory excavated or borrow material or as otherwise shown or specified. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below the surface of the shoulder. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.14 FINISHING

The surface of excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Gutters and ditches shall be finished in a manner that will

result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades re-established to the required elevations and slopes.

3.14.1 Subgrade and Embankments

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

3.14.2 Grading Around Structures

Areas within 5 feet outside of each building and structure line shall be constructed true-to-grade, shaped to drain, and shall be maintained free of trash and debris until final inspection has been completed and the work has been accepted.

3.15 PLACING TOPSOIL

On areas to receive topsoil, the compacted subgrade soil shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 4 inches and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from offsite areas.

3.16 TESTING

Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. Field in-place density shall be determined in accordance with ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are

representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.16.1 Fill and Backfill Material Gradation

One test per 1000 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C 136.

3.16.2 In-Place Densities

a. One test per 2000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 500 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

c. One test per 100 linear feet, or fraction thereof, of each lift of embankment or backfill for roads.

3.16.3 Check Tests on In-Place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows:

a. One check test per lift for each 10,000 square feet, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

b. One check test per lift for each 2500 square feet, of fill or backfill areas compacted by hand-operated machines.

c. One check test per lift for each 500 linear feet, or fraction thereof, of embankment or backfill for roads.

3.16.4 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer.

3.16.5 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 1000 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.16.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.16.7 Displacement of Sewers

After other required tests have been performed and the trench backfill compacted to the finished grade surface, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 36 inches shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

3.17 DISPOSITION OF SURPLUS MATERIAL

Surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber shall be removed from Government property as directed by the Contracting Officer.

-- End of Section --

SECTION 02510N

WATER DISTRIBUTION
09/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.5.2.1M	(1981; R 1995) Metric Round Head Short Square Neck Bolts

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105	(1999) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110	(1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1219 mm), for Water
AWWA C111	(2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1999) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(2002) Ductile-Iron Pipe, Centrifugally Cast, for Water
AWWA C153	(2000) Ductile-Iron Compact Fittings for Water Service
AWWA C500	(2002; A C500a-95) Metal-Seated Gate Valves for Water Supply Service
AWWA C509	(2001) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	(1999) Disinfecting Water Mains
AWWA C900	(1997) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution

AWWA M23	(2002) Manual: PVC Pipe - Design and Installation

ASME INTERNATIONAL (ASME)

ASME B16.1	(1998) Cast Iron Pipe Flanges and Flanged Fittings
ASME B18.2.2	(1987; R 1999) Square and Hex Nuts
ASME B18.5.2.2M	(1982; R 2000) Metric Round Head Square Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A 307	(2002) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 47	(1999) Ferritic Malleable Iron Castings
ASTM A 536	(1984; R 1999e1) Ductile Iron Castings
ASTM A 563	(2000) Carbon and Alloy Steel Nuts
ASTM C 94	(1994) Ready-Mixed Concrete
ASTM D 3139	(1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 477	(2002e1) Elastomeric Seals (Gaskets) for Joining Plastic Pipe

UNDERWRITERS LABORATORIES (UL)

UL 262	(1994; Rev thru Dec 1998) Gate Valves for Fire-Protection Service

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	(1992) Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inch)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Indicator posts

Corporation stops

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Installation procedures for water piping

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.3.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

2.1.1.1 Ductile-Iron Piping

a. Pipe and Fittings: Pipe, AWWA C151, Pressure Class 150 Thickness Class 50. Fittings, AWWA C110 or AWWA C153; fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining, AWWA C104, standard thickness.

b. Joints and Jointing Material:

(1) Joints: Joints for pipe and fittings shall be push-on joints or mechanical joints unless otherwise indicated. Provide mechanical joints where indicated.

(2) Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly, AWWA C111.

(3) Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111.

(4) Flanged Joints: Bolts, nuts, and gaskets for flanged connections as recommended in the Appendix to AWWA C115. Flange for setscrewed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250. Setscrews for setscrewed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket for setscrewed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111. Design of setscrewed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made.

(5) Insulating Joints: Designed to effectively prevent metal-to-metal contact at the joint between adjacent sections of piping. Joint shall be of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers. Gasket shall be of the dielectric type, full face, and in other respects as recommended in the Appendix to AWWA C115. Bolts and nuts, as recommended in the Appendix to AWWA C115.

2.1.1.2 Polyvinyl Chloride (PVC) Plastic Piping

a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD. Molecular Oriented (MO) PVC pipe, AWWA C900,shall be plain end or gasket bell end, Pressure Class 150 with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110 or AWWA C153, and have cement-mortar lining, AWWA C104, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as

fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph.

b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

2.1.2 Valves and Other Water Main Accessories

2.1.2.1 Gate Valves on Buried Piping

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 175 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the coupling. Valves shall be of one manufacturer.

2.1.2.2 Valve Boxes

Provide a valve box for each gate valve. Valve boxes shall be of cast iron or precast concrete of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.2.3 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and

bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Malleable and ductile iron shall, conform to ASTM A 47 and ASTM A 536, respectively. Steel shall have a strength not less than that of the pipe. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ANSI B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be 5 for 6 inch pipe. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

2.1.2.4 Tracer Wire for Nonmetallic Piping

Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Terminate the work covered by this section at a point approximately 5 feet from the building. Where the location of the water line is not clearly defined by dimensions on the drawings, do not lay water line closer horizontally than 10 feet from any sewer line. Where water lines cross under gravity sewer lines, encase sewer line fully in concrete for a distance of at least 10 feet on each side of the crossing, unless sewer line is made of pressure pipe with rubber-gasketed joints and no joint is located within 3 feet horizontally of the crossing. Lay water lines which cross sewer force mains and inverted siphons at least 2 feet above these sewer lines; when joints in the sewer line are closer than 3 feet horizontally from the water line, encase these joints in concrete. Do not lay water lines in the same trench with gas lines, fuel lines or electric wiring.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02300

3.1.1.3 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean

condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 2 1/2 feet.

3.1.1.4 Installation of Tracer Wire

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.1.1.5 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped.

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of Ductile-Iron Piping

Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

a. Jointing: Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWA C111. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer.

b. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one

part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

c. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with AWWA C105.

3.1.2.2 Installation of PVC Plastic Water Main Pipe

Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

a. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

b. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

3.1.2.3 Installation of Valves

a. Installation of Valves: Install gate valves, AWWA C500 and UL 262,

in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation." Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

3.1.3 Installation of Water Service Piping

3.1.3.1 Location

Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at a point directed by the Contracting Officer; such water service lines shall be closed with plugs or caps.

3.1.4 Disinfection

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable water is not required.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

3.2.2 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints shall not exceed the amounts given in

AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed.

3.2.3 Special Testing Requirements

For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

-- End of Section --

SECTION 02531

SANITARY SEWERS
07/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 969	(2002) Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM D 2321	(2000) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2412	(2002) Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D 2680	(2001) Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
ASTM D 2751	(1996a) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 3034	(2000) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a; R 2003) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F 477	(2002e1) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 949	(2003) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	(1998) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe

1.2 SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Provide polyvinyl chloride (PVC) plastic pipe, size as shown on drawings. Provide building connections as required.

1.3 GENERAL REQUIREMENTS

The construction required herein shall include appurtenant structures and building sewers to points of connection with the building drains 5 feet outside the building to which the sewer system is to be connected. The Contractor shall replace damaged material and redo unacceptable work at no additional cost to the Government. Excavation and backfilling is specified in Section 02300 EARTHWORK. Backfilling shall be accomplished after inspection by the Contracting Officer. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install the plastic pipe shall be stored in accordance with the manufacturer's recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Pipeline materials

Submit manufacturer's standard drawings or catalog cuts.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

1.5.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.5.1.2 Metal Items

Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

1.5.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

Pipe shall conform to the respective specifications and other requirements specified below.

2.1.1 PVC Plastic Gravity Sewer Piping

2.1.1.1 PVC Plastic Gravity Pipe and Fittings

ASTM D 3034, SDR 35, or ASTM F 949 with ends suitable for elastomeric gasket joints.

2.1.1.2 PVC Plastic Gravity Joints and Jointing Material

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

Apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water main or service line. Where sanitary sewer lines pass above water lines, encase sewer in concrete for a distance of 10 feet on each side of the crossing, or substitute rubber-gasketed pressure pipe for the pipe being used for the same distance. Where sanitary sewer lines pass below water lines, lay pipe so that no joint in the sewer line will be closer than 3 feet, horizontal distance, to the water line.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02300.

3.1.1.3 Pipe Laying and Jointing

Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay nonpressure pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots or tongues and grooves will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow

sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

Branch connections shall be made by use of regular fittings or solvent cemented saddles as approved. Saddles for ABS and PVC composite pipe shall conform to Figure 2 of ASTM D 2680; saddles for ABS pipe shall comply with Table 3 of ASTM D 2751; and saddles for PVC pipe shall conform to Table 4 of ASTM D 3034.

3.1.1.4 Connections to Existing Lines

Obtain approval from the Contracting Officer before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.3 Miscellaneous Construction and Installation

3.1.3.1 Connecting to Existing Manholes

Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

3.1.3.2 Metal Work

a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Tests for Nonpressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a nonpressure line for nonpressure use, test this piping as specified for nonpressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969.

b. Low-pressure air tests: Perform tests as follows:

(1) PVC plastic pipelines: Test in accordance with UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

3.2.2.2 Deflection Testing

Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads determined in accordance with ASTM D 2412. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.

a. Pull-through device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a design promulgated by the Uni-Bell Plastic Pipe Association, provided the device meets the applicable requirements specified in this paragraph, including

those for diameter of the device, and that the mandrel has a minimum of 9 arms. Ball, cylinder, or circular sections shall conform to the following:

(1) A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.

(2) Homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface Brinell hardness of not less than 150.

(3) Center bored and through-bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of not less than 70,000 pounds per square inch, with eyes or loops at each end for attaching pulling cables.

(4) Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.

b. Deflection measuring device: Sensitive to 1.0 percent of the diameter of the pipe being tested and shall be accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved prior to use.

c. Pull-through device procedure: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions.

d. Deflection measuring device procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, replace pipe which has excessive deflection and completely retest in same manner and under same conditions.

-- End of Section --

SECTION 02630

STORM DRAINAGE
07/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 198	(2003) Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM INTERNATIONAL (ASTM)

ASTM C 425	(2002) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(2002) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 506	(2002) Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2167	(1994; R 2001) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2922	(2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2001) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-07 Certificates

Determination of Density
Frame and Cover for Gratings

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Reinforced Arch Culvert and Storm Drainpipe

ASTM C 506, Class A-III.

2.2 Joints

2.2.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to

ASTM C 443. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 02300 EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 24 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements.

Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

3.3.1 Concrete Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4 Concrete Pipe

3.4.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to

hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 8 inches apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 1/2 inch, thick and the width of the diaper band shall be at least 8 inches. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to

receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.7 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.4.8 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.5 BACKFILLING

3.5.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 6 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.5.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall

be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 9 inches.

3.5.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.5.4 Compaction

3.5.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.5.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.5.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density

relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

-- End of Section --

SECTION 02752N

PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES
09/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(1999) Specifications for Structural Concrete for Buildings
ACI 305R	(1999) Hot Weather Concreting
ACI 306.1	(1990) Standard Specification for Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M	(2001) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 1077	(2003) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260	(2001) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 143/C 143M	(2003) Slump of Hydraulic Cement Concrete
ASTM C 150	(2002ae1) Portland Cement
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete

ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Concrete Aggregates
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 94/C 94M	(2003a) Ready-Mixed Concrete

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Curing materials

Admixtures

Dowel

Reinforcement

Submit a complete list of materials including type, brand and applicable reference specifications.

SD-05 Design Data

Concrete mix design

Thirty days minimum prior to concrete placement, submit a mix design, with applicable tests, for each strength and type of concrete for approval. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. Submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Obtain acknowledgement of approvals prior to concrete placement. Submit a new mix design for each material source change.

SD-06 Test Reports

Aggregate tests

Concrete slump tests

Air content tests

Compression strength tests

SD-07 Certificates

Ready-mixed concrete plant

Batch tickets

Cementitious materials

1.3 DELIVERY, STORAGE, AND HANDLING

ASTM C 94/C 94M.

1.4 QUALITY ASSURANCE

1.4.1 Ready-mixed Concrete Plant Certification

Provide documentation that the ready-mix plant is certified by the National Ready-Mix Concrete Association (NRMCA).

1.4.2 Required Information

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cementitious materials, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Sampling and testing of materials, concrete mix design, sampling and testing in the field shall be performed by a commercial testing laboratory which conforms to ASTM C 1077. The laboratory shall be approved in writing by the Government.

1.4.3 Batch Tickets

ASTM C 94/C 94M. Submit mandatory batch ticket information for each load of ready-mixed concrete.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

2.1.1.1 Cement

ASTM C 150, Type I or II with maximum alkali content of 0.60%. Cement certificate shall include test results in accordance with ASTM C 150, including equivalent alkalies indicated in the Supplementary Optional Chemical Requirements.

2.1.1.2 Fly Ash and Pozzolan

ASTM C 618, Type F, except that the maximum allowable loss on ignition shall be 6%, maximum available alkalies content shall be 1.5%, and maximum calcium oxide (CaO) content 8%. Fly ash certificates shall include test results in accordance with ASTM C 618, including available alkalies indicated in the Supplementary Optional Chemical Requirements.

2.1.2 Water

ASTM C 94/C 94M, fresh, clean, and potable.

2.1.3 Aggregate

2.1.3.1 Alkali Reactivity Test

Fine and Coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with ASTM C 1260. The coarse and fine aggregates shall be evaluated in a combination which matches the contractors' proposed mix design (including Class F fly ash or GGBF slag), utilizing the modified version of ASTM C 1260. Test results of the combination shall have a measured expansion of less than 0.08 percent at 16 days. Should the test data indicate an expansion of greater than 0.08%, the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources for retesting or may submit additional test results incorporating Lithium Nitrate for consideration.

ASTM C 1260 shall be modified as follows to include one of the following options:

a. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and fly ash.

b. Utilize the contractor's proposed low alkali Portland cement and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement and GGBF.

c. Utilize the contractor's proposed low alkali Portland cement and Class F fly ash and ground granulated blast furnace (GGBF) slag in combination for the test proportioning. The laboratory shall use the contractor's proposed percentage of cement, fly ash and GGBF.

2.1.3.2 Fine Aggregates

ASTM C 33.

2.1.3.3 Coarse Aggregates

ASTM C 33.

2.1.4 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Where not shown or specified, the use of admixtures is subject

to written approval of the Contracting Officer.

ASTM C 260: Air-entraining.

2.1.5 Reinforcement

2.1.5.1 Dowel Bars

Bars shall conform to ASTM A 615/A 615M, Grade 60 for plain billet-steel bars of the size and length indicated. Remove all burrs and projections from the bars.

2.1.5.2 Reinforcement

Deformed steel bar mats shall conform to ASTM A 184/A 184M. Bar reinforcement shall conform to ASTM A 615/A 615M Grade 60.

2.1.6 Curing Materials

2.1.6.1 White-Burlap-Polyethylene Sheet

ASTM C 171, 0.004 inch thick white opaque polyethylene bonded to 10 oz/linear yard (40 inch) wide burlap.

2.1.6.2 Liquid Membrane-Forming Compound

ASTM C 309, white pigmented, Type 2, Class B, free of paraffin or petroleum.

2.1.7 Joint Fillers and Sealants

Provide as specified on the drawings.

2.2 CONTRACTOR-FURNISHED MIX DESIGN

Contractor-furnished mix design concrete shall be designed in accordance with ACI 211.1 except as modified herein, and the mix design shall be as specified herein under paragraph entitled "Submittals." The concrete shall have a minimum compressive strength of 4000 pounds per square inch at 90 days. The concrete may be air entrained. If air entrainment is used the air content shall be 5.0 plus or minus 1.5 percent. Maximum size aggregate for slip forming shall be 1.5 inches. The minimum cementitious factor is 564 lbs per cubic yard and slump shall be 1 to 3 inches (or less when slip form is used.

If the cementitious material is not sufficient to produce concrete of the flexural strength required it shall be increased as necessary, without additional compensation under the contract. The cementitious factor shall be calculated using cement, Class F fly ash, and or GGBF slag. The mix shall use a cement replacement (by weight) of 25%-35% Class F fly ash, or 40%-50% GGBF slag, or a combination of the two. In the combination, each 5% of Class F fly ash shall be replaced by 8% GGBF slag.

PART 3 EXECUTION

3.1 FORMS

3.1.1 Construction

Construct forms to be removeable without damaging the concrete.

3.1.2 Coating

Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bondbreaker before concrete is placed.

3.1.3 Grade and Alignment

Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

3.2 REINFORCEMENT

3.2.1 Dowel Bars

Install bars accurately aligned, vertically and horizontally, at indicated locations and to the dimensions and tolerances indicated. Before installation thoroughly grease the sliding portion of each dowel. Dowels must remain in position during concrete placement and curing.

3.2.2 Setting Slab Reinforcement

Reinforcement shall be positioned on suitable chairs prior to concrete placement. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. The laps at splices shall be 12 inches minimum and the distances from ends and sides of slabs and joints shall be as indicated.

3.3 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE

3.3.1 Measuring

ASTM C 94/C 94M.

3.3.2 Mixing

ASTM C 94/C 94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, reduce mixing time and place concrete within 60 minutes. Additional water may be added to bring slump within required limits as specified in Section 11.7 of ASTM C 94/C 94M, provided that the specified water-cement ratio is not exceeded.

3.3.3 Conveying

ASTM C 94/C 94M.

3.3.4 Placing

Follow guidance of ACI 301, except as modified herein. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete continuosly at a uniform rate, with minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment

failure or other emegencies. If this occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.

3.3.5 Vibration

Immediately after spreading concrete, consolidate concrete with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs 6 inches or more in thickness. Limit duration of vibration to that necessary to produce consolidation of concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Contracting Officer may be used to consolidate concrete in unreinforced pavement slabs less than 6 inches thick.

3.3.5.1 Vibrating Equipment

Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount units on a frame that is capable of vertical movement and, when necessary, radial movement, so vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. Clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. Distance between end of vibrating tube and side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches from subbase, and top of vibrator a few inches below pavement surface. Vibrators may be pneumatic, gas driven, or electric, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. Amplitude of vibration shall be such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified.

3.3.6 Cold Weather

Except with authorization, do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval of the Contracting Officer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306.1.

3.3.7 Hot Weather

Maintain required concrete temperature in accordance with Figure 2.1.5 in ACI 305R to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is

sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Follow practices found in ACI 305R.

3.4 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms.

3.4.1 Consolidation

The paver vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.4.2 Operation

When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provisions shall be made to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of any debris, and placing rubber mats beneath the paver tracks. Transversely oscillating screeds and extrusion plates shall overlap the existing pavement the minimum possible, but in no case more than 8 inches.

3.4.3 Required Results

The paver-finisher shall be operated to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. The paver-finishing operation shall produce a surface finish free of irregularities, tears, voids of any kind, and any other discontinuities. It shall produce only a very minimum of paste at the surface. Multiple passes of the paver-finisher shall not be permitted. The equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.

3.4.4 Fixed Form Paving

Forms shall be steel, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.

3.4.5 Slipform Paving

The slipform paver shall shape the concrete to the specified and indicated cross section in one pass, and shall finish the surface and edges so that only a very minimum amount of hand finishing is required. Dowels shall not be installed by dowel inserters attached to the paver or by any other means of inserting the dowels into the plastic concrete.

3.4.6 Placing Reinforcing Steel

Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement.

3.4.7 Placing Dowels and Tie Bars

Dowels shall be installed with alignment not greater than 1/8 inch per ft. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 5/8 inch and a vertical tolerance of plus or minus 3/16 inch. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels in joints shall be omitted when the center of the dowel is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness.

3.4.7.1 Contraction Joints

Dowels in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal basket assemblies. The dowels shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by means of suitable anchors.

3.4.7.2 Construction Joints-Fixed Form Paving

Installation of dowels shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.4.7.3 Dowels Installed in Hardened Concrete

Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel.

3.5 FINISHING CONCRETE

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

3.5.1 Side Form Finishing

Strike off and screed concrete to the required crown and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Contracting Officer. Elevation of concrete shall be such that, when consolidated and finished, pavement surface will be adequately consolidated and at the required grade. Equip finishing machine with two screeds which are readily and accurately adjustable for changes in pavement crown and compensation for wear and other causes. Make as many passes over each area of pavement and at such intervals as necessary to give proper compaction, retention of coarse aggregate near the finished surface, and a surface of uniform texture, true to grade and crown. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.

3.5.1.1 Equipment Operation

Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screed for its entire length.

3.5.1.2 Joint Finish

Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.

3.5.1.3 Hand Finishing

Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template.

3.5.1.4 Longitudinal Floating

After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.

3.5.2 Brooming

Finish the surface of the slab by brooming the surface with a new wire broom at least 18 inches wide. Gently pull the broom over the surface of

the pavement from edge to edge just before the concrete becomes non-plastic. Slightly overlap adjacent strokes of the broom. Broom perpendicular to centerline of pavement so that corrugations produced will be uniform in character and width, and not more than 1/16 inch in depth. Broomed surface shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface.

3.5.3 Edging

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of one-eighth inch. When brooming is specified for the final surface finish, edge transverse joints before starting brooming, then operate broom to obliterate as much as possible the mark left by the edging tool without disturbing the rounded corner left by the edger. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Remaining edges shall be smooth and true to line.

3.5.4 Repair of Surface Defects

Follow guidance of ACI 301.

3.6 CURING AND PROTECTION

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use White-Burlap-Polyethylene Sheet or liquid membrane-forming compound, except as specified otherwise herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded. Maintain temperature of air next to concrete above 40 degrees F for the full curing periods.

3.6.1 White-Burlap-Polyethylene Sheet

Wet entire exposed surface thoroughly with a fine spray of water, saturate burlap but do not have excessive water dripping off the burlap and then cover concrete with White-Burlap-Polyethylene Sheet, burlap side down. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure burlap has not lost all moisture. If moisture evaporates, resaturate burlap and re-place on pavement (re-saturation and re-placing shall take no longer than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for at least 7 days.

3.6.2 Liquid Membrane-Forming Compound Curing

Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat

continuous operation by suitable power-spraying equipment. Total coverage for the two coats shall be at least one gallon of undiluted compound per 200 square feet. Compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of compound immediately to areas where film is defective. Respray concrete surfaces that are subject to heavy rainfall within 3 hours after curing compound has been applied in the same manner.

3.6.2.1 Protection of Treated Surfaces

Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.7 FIELD QUALITY CONTROL

3.7.1 Sampling

The Contractor's approved laboratory shall collect samples of fresh concrete in accordance with ASTM C 172 during each working day as required to perform tests specified herein. Make test specimens in accordance with ASTM C 31/C 31M.

3.7.2 Consistency Tests

The Contractor's approved laboratory shall perform concrete slump tests in accordance with ASTM C 143/C 143M. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and for each batch (minimum) or every 20 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams and cylinders are made.

3.7.3 Compressive Strength Tests

The Contractor's approved laboratory shall test for compressive strength in accordance with ASTM C 39. Make four test specimens for each set of tests. Test two specimens at 7 days, and the other two at 28 days. Concrete strength will be considered satisfactory when the minimum of the 28-day test results equals or exceeds the specified 28-day compressive strength, and no individual strength test is less than 3500 pounds per square inch. If the ratio of the 7-day strength test to the specified 28-day strength is less than 65 percent, make necessary adjustments for conformance. Frequency of compressive tests on concrete cylinders shall be not less than four test cylinders for each 50 cubic yards of concrete, or fraction thereof, placed. Concrete which is determined to be defective, based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.

3.7.4 Air Content Tests

Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C 231 on samples taken during placement of concrete in forms.

3.7.5 Surface Testing

Surface testing for surface smoothness and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

3.7.5.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified when checked with a 12 foot straightedge: 1/5 inch longitudinal and 1/4 inch transverse directions for roads and streets and 1/4 inch for both directions for other concrete surfaces, such as parking areas.

3.7.5.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

3.7.6 Plan Grade Testing and Conformance

The surfaces shall vary not more than 0.06 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

3.7.7 Test for Pavement Thickness

Measure during concrete placement to determine in-place thickness of concrete pavement.

3.7.8 Reinforcement

Inspect reinforcement prior to installation to assure it is free of loose flaky rust, loose scale, oil, mud, or other objectionable material.

3.7.9 Dowels

Inspect dowel placement prior to placing concrete to assure that dowels are of the size indicated, and are spaced, aligned and painted and oiled as specified. Dowels shall not deviate from vertical or horizontal alignment after concrete has been placed by more than 1/8 inch per foot.

-- End of Section --

SECTION 02921

SEEDING
05/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602	(1995a; R 2001) Agricultural Liming Materials
ASTM D 4972	(2001) pH of Soils

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1995) Federal Seed Act Rules and Regulations of the Secretary of Agriculture
DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.2 DEFINITIONS

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

Section 02300 EARTHWORK.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood cellulose fiber mulch

Fertilizer

Include physical characteristics, and recommendations.

SD-06 Test Reports

Topsoil composition tests (reports and recommendations).

SD-07 Certificates

State certification and approval for seed

SD-08 Manufacturer's Instructions

Erosion Control Materials

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.1.2 Fertilizer and Lime Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer and lime may be furnished in bulk with certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Seed, Fertilizer and Lime Storage

Store in cool, dry locations away from contaminants.

1.5.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.5.2.3 Handling

Do not drop or dump materials from vehicles.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit.

1.7 TIME LIMITATIONS

1.7.1 Seed

Apply seed within twenty four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Classification

Provide State-certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mix is performed on site in the presence of the Contracting Officer.

2.1.2 Planting Dates

Planting Season	Planting Dates
Season 1	Mar. 1 - July 15
Temporary Seeding	Sept. 1 - Nov. 30

2.1.3 Seed Purity

Botanical Name	Common Name	Min. Percent Pure Seed	Min. Percent Germination and Hard Seed	Max. Percent Weed Seed
Cynodon dactylon	Common Bermuda	95	90	1
Lolium multiflorum	Rye Grass	95	90	1

2.1.4 Seed Mixture by Weight

Planting Season	Variety	Percent (by Weight)
Season 1	Common Bermuda	15 lbs
Temporary Seeding	Common Bermuda	10 lbs
	Rye Grass	30 lbs

Proportion seed mixtures by weight. Temporary seeding must later be replaced by Season 1 plantings for a permanent stand of grass. The same requirements of turf establishment for Season 1 apply for temporary seeding.

2.2 TOPSOIL

2.2.1 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph entitled "Composition." When available topsoil shall be existing surface soil stripped and stockpiled on-site in accordance with Section 02300 EARTHWORK.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the Contractor.

2.2.3 Composition

Containing from 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. The pH shall be tested in accordance with ASTM D 4972. Topsoil shall be free of sticks, stones, roots, and other debris and objectionable materials. Other components shall conform to the following limits:

Silt	25-50 percent
Clay	10-30 percent
Sand	20-35 percent
pH	5.5 to 7.0
Soluble Salts	600 ppm maximum

2.3 SOIL CONDITIONERS

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.3.1 Lime

Commercial grade hydrate or burnt limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C 602 of not less than 80 percent.

2.4 FERTILIZER

2.4.1 Granular Fertilizer

Synthetic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

13 percent available nitrogen
13 percent available phosphorus
13 percent available potassium

2.5 MULCH

Mulch shall be free from noxious weeds, mold, and other deleterious materials.

2.5.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contrain no fertile seed.

2.5.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.

2.6 WATER

Source of water shall be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

2.7 EROSION CONTROL MATERIALS

Erosion control material shall conform to the following:

2.7.1 Erosion Control Blanket

70 percent agricultural staw/30 percent coconut fiber matrix stitched with a degradable nettings, designed to degrade within 12 months.

2.7.2 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.1.1.1 Topsoil

Provide 4 inches of existing soil to meet indicated finish grade. After areas have been brought to indicated finish grade, incorporate fertilizer pH adjusters into soil a minimum depth of 4 inches by disking, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.1.2 Soil Conditioner Application Rates

Apply soil conditioners at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

Lime 4000 pounds per acre

3.1.1.3 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following:

Synthetic Fertilizer 600 pounds per acre.

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore soil to proper grade. Do not seed when ground is muddy frozen or in an unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.

3.2.2 Seed Application Method

Seeding method shall be broadcasted and drop seeding.

3.2.2.1 Broadcast and Drop Seeding

Seed shall be uniformly broadcast at the seeding rate. Use broadcast or drop seeders. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed uniformly to a maximum depth of 1/4 inch in clay soils and 1/2 inch in sandy soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

3.2.3 Mulching

3.2.3.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 2 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.2.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.

3.2.5 Erosion Control Material

Install in accordance with manufacturer's instructions, where indicated or as directed by the Contracting Officer.

3.2.6 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to insure thorough wetting of soil to a

depth of 2 inches without run off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations at the Contractor's expense. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work in adjacent areas is complete.

-- End of Section --

SECTION 03300N

CAST-IN-PLACE CONCRETE
02/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(1999) Specifications for Structural Concrete for Buildings
ACI 302.1R	(1996) Guide for Concrete Floor and Slab Construction
ACI 304R	(2000) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306.1	(1990) Standard Specification for Cold Weather Concreting
ACI 318M/318RM	(2002) Metric Building Code Requirements for Structural Concrete and Commentary
ACI 347R	(2001) Guide to Formwork for Concrete
ACI SP-66	(1994) ACI Detailing Manual

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 2000) Burlap Cloth Made from Jute or Kenaf

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 616/A 616M	(1996a) Rail-Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 1017/C 1017M	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1107	(2002) Packaged Dry, Hydraulic-Cement Grout(Nonshrink)
ASTM C 143/C 143M	(2003) Slump of Hydraulic Cement Concrete
ASTM C 150	(2002ae1) Portland Cement
ASTM C 171	(2003) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2001e1) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2002) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2003) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2003a) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2003) Concrete Aggregates
ASTM C 39	(1993a) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(2003) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete
ASTM C 618	(2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM C 94/C 94M	(2003a) Ready-Mixed Concrete
ASTM D 1190	(1997) Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient

	Bituminous Types)
ASTM D 1752	(1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1854	(2002) Jet-Fuel-Resistant Concrete Joint Sealer, Hot-Applied Elastic Type

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

U.S. DEPARTMENT OF COMMERCE (DOC)

PS1	(1995) Construction and Industrial Plywood (APA V995)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-S-1614	(Rev A; Am 1) Sealants, Joint,Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Tar Concrete Pavements
FS UU-B-790	(Rev. A) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

1.2 DEFINITIONS

a. "Cementitious material" as used herein shall include all portland cement, pozzolan, and fly ash.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcing steel; G

Reproductions of contract drawings are unacceptable.

SD-03 Product Data

Materials for curing concrete

Joint sealants

Joint filler

Waterstops

SD-05 Design Data

Concrete mix design; G

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate changes. In addition, copies of the fly ash, and pozzolan test results shall be submitted. The approval of fly ash, and pozzolan test results shall have been within 6 months of submittal date. Obtain acknowledgement of receipt prior to concrete placement.

SD-06 Test Reports

Concrete mix design; G

Fly ash

Pozzolan

Aggregates

Compressive strength tests

Air Content

SD-07 Certificates

Curing concrete elements

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement.

ACI 301 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 Quality Assurance

1.6.1 Drawings

1.6.1.1 Reinforcing Steel

ACI SP-66. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

1.6.2 Test Reports

1.6.2.1 Concrete Mix Design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

1.6.2.2 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C 618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.3 Field Samples

1.6.3.1 Slab Finish Sample

Install minimum of 10 foot by 10 foot slab. Finish as required by specification.

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood: PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

2.2.1 Polyvinylchloride Waterstops

COE CRD-C 572.

2.3 CONCRETE

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301, and ACI 318M/318RM except as otherwise specified. The compressive strength (f'c) of the concrete for each portion of the structure(s) shall be as indicated and as specified below.

Location	f'c (Min. 28-Day Comp. Strength) (psi)	ASTM C 33 Maximum Nominal Aggregate (Size No.)	Range of Slump (inches)	Maximum Water-Cement Ratio (by weight)	Air Entr. (percent)
All areas	4000	57	3-5	.5	6

Maximum slump shown above may be increased 1 inch for methods of consolidation other than vibration. Slump may be increased to 8 inches when superplasticizers are used. Provide air entrainment using air-entraining admixture. Air entrainment shall be within plus or minus 1.5 percent of the value specified. The water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days shall not exceed 0.15.

Note (a): Entrapped air shall be 3% or less.

2.3.1.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, by weight equivalency method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported. For

each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

2.3.1.2 Required Average Strength of Mix Design

The selected mixture shall produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 301. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation shall be calculated and the required average compressive strength shall be determined in accordance with ACI 301. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength shall be as follows:

a. For f'c less than 3000 psi, 1000 psi plus f'c.

b. For f'c between 3000 and 5000 psi, 1200 psi plus f'c.

c. For f'c over 5000 psi, 1400 psi plus f'c.

2.4 MATERIALS

2.4.1 Cement

ASTM C 150, Type I or II and ASTM C 618 pozzolan or fly ash. The pozzolan or fly ash content shall not exceed 25 percent by weight of the total cementitious material.

2.4.1.1 Fly Ash and Pozzolan

ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement.

2.4.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

2.4.3 Aggregates

ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

2.4.4 Nonshrink Grout

ASTM C 1107.

2.4.5 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride

admixtures.

2.4.5.1 Air-Entraining

ASTM C 260.

2.4.5.2 High Range Water Reducer (HRWR) (Superplasticizers)

ASTM C 494/C 494M, Type F and Type G (HRWR retarding admixture) and ASTM C 1017/C 1017M.

2.4.6 Vapor Retarder

Waterproof Paper. Kraft paper, glass reinforcing fibers and layers of polyethylene laminated under heat and pressure to form a single layer meeting the requirements of FS UU-B-790, Type I, Grade A, Style 4; or waterproof paper, regular, conforming to ASTM C 171, consisting of two sheets of kraft paper cemented together with bituminous material in which are embedded cords or strands of fiber running in both directions not more than 1 1/4 inch apart.

2.4.7 Materials for Curing Concrete

2.4.7.1 Impervious Sheeting

ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2.4.7.2 Pervious Sheeting

AASHTO M 182.

2.4.7.3 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented, Type 2, Class B.

2.4.8 Liquid Chemical Sealer-Hardener Compound

Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.4.9 Expansion/Contraction Joint Filler

ASTM D 1751, ASTM D 1752, or 100% recycled material meeting ASTM D 1752 (subparagraphs 5.1 to 5.4). Material shall be 1/2 inch thick.

2.4.10 Joint Sealants

2.4.10.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T. ASTM D 1854 for surfaces subjected to jet fuel.

2.4.10.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C 920, Type M, Grade NS, Class 25, Use T. FS SS-S-1614.

2.4.11 Biodegradable Form Release Agent

Form release agent shall be biodegradable with a maximum of 350 grams/liter (g/l) volatile organic compounds (VOCs). Product shall not bond with, stain, or adversely affect concrete surfaces and shall not impair subsequent treatments of concrete surfaces. The form release agent shall not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.5 REINFORCEMENT

Chairs shall be galvanized.

2.5.1 Reinforcing Bars

ACI 301 unless otherwise specified. ASTM A 615/A 615M and ASTM A 617/A 617M with the bars marked A, S, W, Grade 60; or ASTM A 616/A 616M with the bars marked R, Grade 50.

2.5.2 Reinforcing Bar Supports

Provide bar ties and supports of coated or non corrodible material.

PART 3 EXECUTION

3.1 FORMS

ACI 301. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.1.1 Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.2 Removal of Forms and Supports

After placing concrete, forms shall remain in place for the time periods specified in ACI 347R. Prevent concrete damage during form removal.

3.1.2.1 Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39 test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

3.2 Waterstop Splices

Fusion weld in the field.

3.3 Formed Surfaces

3.3.1 Tolerances

ACI 347R and as indicated.

3.3.2 As-Cast Form

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301. Provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 Vapor Retarder

Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape joints. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement shall not damage vapor barrier material.

3.4.2 Reinforcement Supports

Place reinforcement and secure with galvanized or non corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

3.4.3 Splicing

As indicated. For splices not indicated ACI 301. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches.

3.4.4 Cover

ACI 301 for minimum coverage, unless otherwise indicated.

3.4.5 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.6 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

3.4.7 Expansion Joints and Contraction Joints

Provide expansion joint at edges of interior floor slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C 94/C 94M, ACI 301, ACI 302.1R, and ACI 304R, except as modified herein. Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs entitled "Sampling" and "Testing."

3.5.2 Mixing

ASTM C 94/C 94M and ACI 301. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

3.6.1 Vibration

ACI 301. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18 inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.6.2 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees F Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.3 Hot Weather

ACI 305R. Maintain required concrete temperature using Figure 2.1.5 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Where straightedge measurements are specified, Contractor shall provide straightedge.

3.7.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.7.1.1 Floated

After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. During or after the first floating, surface shall be checked with a 10 foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. High spots shall be cut down and low spots filled during this procedure to produce a surface level within 1/4 inch in 10 feet.

3.7.1.2 Steel Troweled

Use for floors intended as walking surfaces. First, provide a floated finish. The finish shall next be power troweled two times, and finally hand troweled. The first troweling after floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks and uniform in texture and appearance. The finished surface shall produce a surface level to within 1/4 inch in 10 feet. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.

3.7.1.3 Broomed

Use on surfaces of rack wash drive. Perform a floated finish, then draw a broom or burlap belt across the surface to produce a coarse scored texture. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.7.1.4 Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by a burlap drag. Drag a strip of clean, wet burlap from 3 to 10 feet wide and 2 feet longer than the pavement width across the

slab. Produce a fine, granular, sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

3.7.2 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.8 CURING AND PROTECTION

ACI 301 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating.

3.8.1 Moist Curing

Remove water without erosion or damage to the structure.

3.8.1.1 Ponding or Immersion

Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.8.1.2 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.8.1.3 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

3.8.1.4 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or

wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.8.2 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

3.8.2.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.8.2.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.8.3 Curing Periods

ACI 301 except 10 days for retaining walls, pavement or chimneys, 21 days for concrete that will be in full-time or intermittent contact with seawater, salt spray, alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Contracting Officer.

3.9 FIELD QUALITY CONTROL

3.9.1 Sampling

ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

3.9.2 Testing

3.9.2.1 Slump Tests

ASTM C 143/C 143M. Take concrete samples during concrete placement. The

maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.9.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.9.2.3 Compressive Strength Tests

ASTM C 39. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests shall be taken once a day, nor less than once for each 50 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.9.2.4 Air Content

ASTM C 173/C 173M or ASTM C 231 for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

-- End of Section --

SECTION 04200

MASONRY
09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 530/530.1	(2002) Building Code Requirements for Masonry Structures and Specifications for Masonry Structures and Commentaries

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 641/A 641M	(1998) Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A 82	(2002) Steel Wire, Plain, for Concrete Reinforcement
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM C 1019	(2003) Sampling and Testing Grout
ASTM C 1072	(2000a) Measurement of Masonry Flexural Bond Strength
ASTM C 1142	(1995; R 2001) Extended Life Mortar for Unit Masonry
ASTM C 129	(2003) Nonloadbearing Concrete Masonry Units
ASTM C 144	(2003) Aggregate for Masonry Mortar
ASTM C 150	(2002ae1) Portland Cement
ASTM C 207	(1991; R 1997) Hydrated Lime for Masonry Purposes

ASTM C 270	(2003) Mortar for Unit Masonry
ASTM C 476	(2002) Grout for Masonry
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete
ASTM C 641	(1998e1) Staining Materials in Lightweight Concrete Aggregates
ASTM C 67	(2003a) Sampling and Testing Brick and Structural Clay Tile
ASTM C 744	(1999) Prefaced Concrete and Calcium Silicate Masonry Units
ASTM C 780	(2002) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 90	(2003) Loadbearing Concrete Masonry Units
ASTM C 91	(2003a) Masonry Cement
ASTM C 94/C 94M	(2003a) Ready-Mixed Concrete
ASTM D 2000	(2001) Rubber Products in Automotive Applications
ASTM D 2240	(2003) Rubber Property - Durometer Hardness
ASTM D 2287	(1996; R 2001) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E 514	(2002) Water Penetration and Leakage Through Masonry

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

SD-03 Product Data

Clay or Shale Brick; G
Insulation; G
Flashing; G
Water-Repellant Admixture; G

Manufacturer's descriptive data.

SD-04 Samples

Concrete Masonry Units (CMU); G

Anchors, Ties, and Bar Positioners; G

Two of each type used.

Expansion-Joint Materials; G

One piece of each type used.

Joint Reinforcement; G

One piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

SD-05 Design Data

Pre-mixed Mortar; G
Unit Strength Method; G

Pre-mixed mortar composition. Calculations and certifications of masonry unit and mortar strength.

SD-06 Test Reports

Efflorescence Test; G

Test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project.

SD-07 Certificates

Concrete Masonry Units (CMU)
Expansion-Joint Materials
Joint Reinforcement
Masonry Cement
Admixtures for Masonry Mortar
Admixtures for Grout

Certificates of compliance stating that the materials meet the specified requirements.

SD-08 Manufacturer's Instructions

Masonry Cement

When masonry cement is used, submit the manufacturer's printed instructions on proportions of water and aggregates and on mixing to obtain the type of mortar required.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.3.1 Masonry Units

Concrete masonry units shall be covered or protected from inclement weather. Store Type II, concrete masonry units at the site for a minimum

of 28 days for air cured units, 10 days for atmospheric steam or water cured units, and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F for at least 5 hours. Protect moisture controlled units (Type I) from rain and ground water. Prefabricated lintels shall be marked on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.3.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.3.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

1.4 QUALITY ASSURANCE

1.4.1 Testing

Masonry strength shall be determined in accordance with ACI 530/530.1; submit test reports on three prisms as specified in ACI 530/530.1. The cost of testing shall be paid by the Contractor.

1.4.2 Spare Vibrator

Maintain at least one spare vibrator on site at all times.

1.4.3 Bracing and Scaffolding

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by local code.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval.

2.2 CONCRETE MASONRY UNITS (CMU)

Cement shall have a low alkali content and be of one brand. Units shall be of modular dimensions and air, water, or steam cured. Exposed surfaces of units shall be smooth and of uniform texture. Exterior concrete masonry units shall have water-repellant admixture added during manufacture.

a. Hollow Load-Bearing Units: ASTM C 90, Type I or II, made with lightweight or normal weight aggregate. Provide load-bearing

units for exterior walls, foundation walls, load-bearing walls, and shear walls.

b. Hollow Non-Load-Bearing Units: ASTM C 129, Type I or II, made with lightweight or normal weight aggregate. Load-bearing units may be provided in lieu of non-load-bearing units.

c. Solid Load-Bearing Units: ASTM C 90, Type I or II, lightweight or normal weight units. Provide solid units as indicated.

2.2.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C 641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

2.2.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated. In exposed interior masonry surfaces, units having a bullnose shall be used for vertical external corners except at door, window, and louver jambs. Radius of the bullnose shall be 1 inch. Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

2.3 MASONRY MORTAR

Mortar Type S shall conform to the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate; Type N cement-lime mortar proportions shall be 1 part cement, 1 part lime and 6 parts aggregate. Type N or S mortar shall be used for non-load-bearing, non-shear-wall interior masonry; and Type S for remaining masonry work; except where higher compressive strength is indicated on structural drawings. When masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C 780 and ASTM C 1072. Pointing mortar in showers and kitchens shall contain ammonium stearate, or aluminum tri-stearate, or calcium stearate in an amount equal to 3 percent by weight of cement used. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.3.1 Admixtures for Masonry Mortar

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.3.2 Hydrated Lime and Alternates

Hydrated lime shall conform to ASTM C 207, Type S. Lime alternates which have a current ICBO, ICBO UBC, Evaluation Report number whose findings state it may be used as an alternate to lime for Type M, S, N, and O mortars will be deemed acceptable provided the user follows the manufacturer's proportions and mixing instructions as set forth in ICBO

report.

2.3.3 Cement

Portland cement shall conform to ASTM C 150, Type I. Masonry cement shall conform to ASTM C 91, Type S. Containers shall bear complete instructions for proportioning and mixing to obtain the required types of mortar.

2.3.4 Pre-Mixed Mortar

Pre-mixed mortar shall conform to ASTM C 1142, Type RS.

2.3.5 Sand and Water

Sand shall conform to ASTM C 144. Water shall be clean, potable, and free from substances which could adversely affect the mortar.

2.4 WATER-REPELLANT ADMIXTURE

Polymeric type formulated to reduce porosity and water transmission. Construct panels of masonry units conforming to ASTM C 744 and mortar which contain the water-repellant admixture. When tested in accordance with ASTM C 1072, such panels shall have flexural strength not less than that specified or indicated. When tested in accordance with ASTM E 514, panels shall exhibit no water visible on back of test panel and no leaks through the panel after 24 hours, and not more than 25 percent of wall area shall be damp after 72 hours.

2.5 GROUT AND READY-MIXED GROUT

Grout shall conform to ASTM C 476, fine. Cement used in grout shall have a low alkali content. Grout slump shall be between 8 and 10 inches. Minimum grout strength shall be 2000 psi in 28 days, as tested by ASTM C 1019. Grout shall be used subject to the limitations of Table III. Proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in grout for the work unless additional evidence is furnished that the grout meets the specified requirements. Ready-Mixed grout shall conform to ASTM C 94/C 94M.

2.5.1 Admixtures for Grout

In cold weather, a non-chloride based accelerating admixture may be used subject to approval; accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C. In general, air-entrainment, anti-freeze or chloride admixtures shall not be used except as approved by the Contracting Officer.

2.5.2 Grout Barriers

Grout barriers for vertical cores shall consist of fine mesh wire, fiberglass, or expanded metal.

2.6 ANCHORS, TIES, AND BAR POSITIONERS

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153/A 153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to ASTM A 82. Wire ties or anchors in exterior walls shall conform to ASTM A 641/A 641M. Joint reinforcement in interior walls, and in exterior or

interior walls exposed to moist environment shall conform to ASTM A 641/A 641M; coordinate with paragraph JOINT REINFORCEMENT below. Anchors and ties shall be sized to provide a minimum of 5/8 inch mortar cover from either face.

2.6.1 Wire Mesh Ties

Wire mesh for tying 4 inch thick concrete masonry unit partitions to other intersecting masonry partitions shall be 1/2 inch mesh of minimum 16 gauge steel wire. Minimum lengths shall be not less than 12 inches.

2.7 JOINT REINFORCEMENT

Joint reinforcement shall be factory fabricated from steel wire conforming to ASTM A 82, welded construction. Tack welding will not be acceptable in reinforcement used for wall ties. Wire shall have zinc coating conforming to ASTM A 153/A 153M, Class B-2. All wires shall be a minimum of 9 gauge. Reinforcement shall be ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units. Joint reinforcement shall be placed a minimum of 5/8 inch cover from either face. The distance between crosswires shall not exceed 16 inches. Joint reinforcement for straight runs shall be furnished in flat sections not less than 10 feet long. Joint reinforcement shall be provided with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features.

2.8 REINFORCING STEEL BARS AND RODS

Reinforcing steel bars and rods shall conform to ASTM A 615/A 615M, Grade 60.

2.9 CONTROL JOINT KEYS

Control joint keys shall be a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D 2000or polyvinyl chloride conforming to ASTM D 2287. The material shall be resistant to oils and solvents. The control joint key shall be provided with a solid shear section not less than 5/8 inchthick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch. The control joint key shall fit neatly, but without forcing, in masonry unit jamb sash grooves. The control joint key shall be flexible at a temperature of minus 30 degrees F after five hours exposure, and shall have a durometer hardness of not less than 70 when tested in accordance with ASTM D 2240.

2.10 EXPANSION-JOINT MATERIALS

Backer rod and sealant shall be adequate to accommodate joint compression equal to 50 percent of the width of the joint. The backer rod shall be compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Sealant shall conform to Section 07920 JOINT SEALANTS.

2.11 FLASHING

Flashing shall be as specified in Section 07600 FLASHING AND SHEET METAL. Provide one of the following types except that the material shall be one which is not adversely affected by dampproofing material.

a. Coated-Copper Flashing: 7 ounce, electrolytic copper sheet, uniformly coated on both sides with acidproof, alkaliproof, elastic bituminous compound. Factory apply coating to a weight of not less than 6 ounces per square foot (approximately 3 ounces per square foot on each side).

b. Copper or Stainless Steel Flashing: Copper, ASTM B 370, minimum 16 ounce weight; stainless steel, ASTM A 167, Type 301, 302, 304, or 316, 0.015 inch thick, No. 2D finish. Provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions. Deformations shall consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

PART 3 EXECUTION

3.1 PREPARATION

Prior to start of work, masonry inspector shall verify the applicable onditions as set forth in ACI 530/530.1, inspection. The Contracting Officer will serve as inspector or will select a masonry inspector.

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent or the ambient air temperature exceeds 90 degrees F and the wind velocity is more than 8 mph. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F or temperature of masonry units is below 40 degrees F, a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Protection

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 40 to 32 Degrees F. Sand or mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F.

b. Air Temperature 32 to 25 Degrees F. Sand and mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature 25 to 20 Degrees F. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained

above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph.

d. Air Temperature 20 Degrees F and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32 degrees F. Temperature of units when laid shall not be less than 20 degrees F.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 40 to 32 degrees F. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 32 to 25 degrees F. Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature 25 to 20 degrees F. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature 20 degrees F and Below. Masonry temperature shall be maintained above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.1.3 Stains

Potect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.1.4 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.1.5 Surfaces

Surfaces on which masonry is to be placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 1/8 inch. Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.2 LAYING MASONRY UNITS

Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Masonry units shall be laid in running bond pattern. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities,

chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.

3.2.1 Forms and Shores

Provide bracing and scaffolding as required. Design bracing to resist wind pressure as required by local codes. Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.2 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Double walls shall be stiffened at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of the double wall. Walls and partitions shall be adequately reinforced for support of wall-hung equipment.

3.2.3 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises	

TOLERANCES

In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 10 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from horizontal lines	
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	1/4 inch
Plus	1/2 inch

3.2.4 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.5 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.5.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.5.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.5.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.2.6 Joint Widths

Joint widths shall be as follows:

3.2.6.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch joints, except for prefaced concrete masonry units.

3.2.7 Embedded Items

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses. Anchors, ties and joint reinforcement shall be fully embedded in the mortar. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.2.8 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Toothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.2.9 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.2.10 Partitions

Partitions shall be continuous from floor to underside of floor or roof deck where shown. Openings in firewalls around joists or other structural members shall be filled as indicated or approved. An isolation joint shall be placed in the intersection between partitions and structural or exterior walls as shown. Interior partitions having 4 inch nominal thick units shall be tied to intersecting partitions of 4 inch units, 5 inches into partitions of 6 inch units, and 7 inches into partitions of 8 inch or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full height of partition or solid masonry units may be used. Interior partitions having masonry walls over 4 inches thick shall be tied together with joint reinforcement. Partitions containing joint reinforcement shall be provided with prefabricated pieces at corners and intersections or partitions.

3.3 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.4 REINFORCING STEEL

Reinforcement shall be cleaned of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond prior to placing grout. Bars with kinks or bends not shown on the drawings shall not be used. Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 2 inches of tops of walls.

3.4.1 Positioning Bars

Vertical bars shall be accurately placed within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Minimum clearance between parallel bars shall be one diameter of the reinforcement. Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

3.4.2 Splices

Bars shall be lapped a minimum of 48 diameters of the reinforcement. Welded or mechanical connections shall develop at least 125 percent of the specified yield strength of the reinforcement.

3.5 JOINT REINFORCEMENT INSTALLATION

Joint reinforcement shall be installed at 16 inches on center or as indicated. Reinforcement shall be lapped not less than 6 inches. Prefabricated sections shall be installed at corners and wall intersections. The longitudinal wires of joint reinforcement shall be placed to provide not less than 5/8 inch cover to either face of the unit.

3.6 PLACING GROUT

Cells containing reinforcing bars shall be filled with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces shall be filled solid with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.6.1 Vertical Grout Barriers for Fully Grouted Walls

Grout barriers shall be provided not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

3.6.2 Horizontal Grout Barriers

Grout barriers shall be embedded in mortar below cells of hollow units receiving grout.

3.6.3 Grout Holes and Cleanouts

3.6.3.1 Grout Holes

Grouting holes shall be provided in slabs, spandrel beams, and other in-place overhead construction. Holes shall be located over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Additional openings spaced not more than 16 inches on centers shall be provided where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, grouting holes shall be plugged and finished to match surrounding surfaces.

3.6.3.2 Cleanouts for Hollow Unit Masonry Construction

Cleanout holes shall be provided at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet. Where all cells are to be grouted, cleanout courses shall be constructed using bond beam units in an inverted position to permit

cleaning of all cells. Cleanout holes shall be provided at a maximum spacing of 32 inches where all cells are to be filled with grout. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanouts shall not be less than 3 by 4 inch openings cut from one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Cleanout holes shall not be closed until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.6.3.3 Cleanouts for Solid Unit Masonry Construction

Cleanouts for construction of walls consisting of a grout filled cavity between solid masonry wythes shall be provided at the bottom of every pour by omitting every other masonry unit from one wythe. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanout holes shall not be plugged until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.6.4 Grouting Equipment

3.6.4.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Pumps shall be operated to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, waste materials and debris shall be removed from the equipment, and disposed of outside the masonry.

3.6.4.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. At least one spare vibrator shall be maintained at the site at all times. Vibrators shall be applied at uniformly spaced points not further apart than the visible effectiveness of the machine. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation without causing segregation.

3.6.5 Grout Placement

Masonry shall be laid to the top of a pour before placing grout. Grout shall not be placed in two-wythe solid unit masonry cavity until mortar joints have set for at least 3 days during hot weather and 5 days during cold damp weather. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 5 feet in height. High-lift grout methods shall be used on pours exceeding 5 feet in height.

3.6.5.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the

masonry due to hydrostatic pressure of the grout. Mortar protruding more than 1/2 inch into the grout space shall be removed before beginning the grouting operation. Grout pours 12 inches or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 12 inches in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.6.5.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 1/4 inch into the grout space shall be removed by dislodging the projections with a rod or stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 4 feet in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 12 to 18 inches into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Maximum Grout Pour Height (feet) (4)	Grout Type	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (in.) (1,2) Grouting Procedure	Multiwythe Masonry (3)	Hollow-unit Masonry
1	Fine	Low Lift	3/4	1-1/2 x 2
5	Fine	Low Lift	2	2 x 3
8	Fine	High Lift	2	2 x 3
12	Fine	High Lift	2-1/2	2-1/2 x 3
24	Fine	High Lift	3	3 x 3
1	Coarse	Low Lift	1-1/2	1-1/2 x 3
5	Coarse	Low Lift	2	2-1/2 x 3

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Maximum Grout Pour Height (feet) (4)	Grout Type	Grouting Procedure	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (in.) (1,2) Multiwythe Masonry (3)	Hollow-unit Masonry
8	Coarse	High Lift	2	3 x 3
12	Coarse	High Lift	2-1/2	3 x 3
24	Coarse	High Lift	3	3 x 4

Notes:

(1) The actual grout space or cell dimension must be larger than the sum of the following items:
a) The required minimum dimensions of total clear areas given in the table above;
b) The width of any mortar projections within the space;
c) The horizontal projections of the diameters of the horizontal reinforcing bars within a cross section of the grout space or cell.

(2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 3/4 inch or greater in width.

(3) For grouting spaces between masonry wythes.

(4) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.7 BOND BEAMS

Bond beams shall be filled with grout and reinforced as indicated on the drawings. Grout barriers shall be installed under bond beam units to retain the grout as required. Reinforcement shall be continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated on the drawings. Where splices are required for continuity, reinforcement shall be lapped 48 bar diameters. A minimum clearance of 1/2 inch shall be maintained between reinforcement and interior faces of units.

3.8 CONTROL JOINTS

Control joints shall be provided as indicated and shall be constructed by using sash jamb units with control joint key in accordance with the details shown on the drawings. Sash jamb units shall have a 3/4 by 3/4 inch groove near the center at end of each unit. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch; backer rod and sealant shall be installed in accordance with Section 07920 JOINT SEALANTS. Exposed interior control joints shall be raked to a

depth of 1/4 inch. Concealed control joints shall be flush cut.

3.9 CONCRETE MASONRY VENEER JOINTS

Concrete masonry veneer joints shall be provided and constructed as shown on the drawings. Joints shall be kept free of mortar and other debris.

3.10 LINTELS

3.10.1 Masonry Lintels

Masonry lintels shall be constructed with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 1/2 inch above the bottom inside surface of the lintel unit.

3.10.2 Steel Lintels

Steel lintels shall be as shown on the drawings. Lintels shall be set in a full bed of mortar with faces plumb and true. Steel and precast lintels shall have a minimum bearing length of 8 inches unless otherwise indicated on the drawings.

3.11 SILLS AND COPINGS

Sills and copings shall be set in a full bed of mortar with faces plumb and true.

3.12 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.12.1 Concrete Masonry Unit Surfaces

Exposed concrete masonry unit surfaces shall be dry-brushed at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.13 BEARING PLATES

Bearing plates for beams, joists, joist girders and similar structural members shall be set to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Bedding mortar and non-shrink grout shall be as specified in Section 03300N CAST-IN-PLACE

CONCRETE.

3.14 PROTECTION

Facing materials shall be protected against staining. Top of walls shall be covered with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.15 TEST REPORTS

3.15.1 Field Testing of Mortar

At least three specimens of mortar shall be taken each day. A layer of mortar 1/2 to 5/8 inch thick shall be spread on the masonry units and allowed to stand for one minute. The specimens shall then be prepared and tested for compressive strength in accordance with ASTM C 780.

3.15.2 Field Testing of Grout

Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C 1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 2000 psi at 28 days.

3.15.3 Efflorescence Test

Brick which will be exposed to weathering shall be tested for efflorescence. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary. Sampling and testing shall conform to the applicable provisions of ASTM C 67. Units meeting the definition of "effloresced" will be subject to rejection.

-- End of Section --

SECTION 05500N

METAL FABRICATIONS
05/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA 46	(1978) Standards for Anodized Architectural Aluminum
AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2000) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.3	(1995) Operations -- Safety Requirements for Powder Actuated Fastening Systems
ANSI B18.2.1	(1996; Errata 2003) Square and Hex Bolts and Screws Inch Series
ANSI B18.6.2	(1972; R 1993) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws
ANSI B18.6.3	(1972; R 1997) Machine Screws and Machine Screw Nuts

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.2	(1987; R 1999) Square and Hex Nuts
ASME B18.21.1	(1999) Lock Washers (Inch Series)
ASME B18.22.1	(1965; R 1998) Plain Washers

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2002) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2003a) Carbon Structural Steel
ASTM A 653/A 653M	(2003) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 687	(1993) High-Strength Nonheaded Steel Bolts and Studs
ASTM B 108	(2003a) Aluminum-Alloy Permanent Mold Castings
ASTM B 209	(2002a) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2002) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 26/B 26M	(2003) Aluminum-Alloy Sand Castings
ASTM D 1187	(1997; R 2002e1) Asphalt-Base Emulsions for Use as Protective Coatings for Metal

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3	(1982; R 2000) Power Tool Cleaning
SSPC SP 6	(2000) Commercial Blast Cleaning

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-664	(Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Embedded angles and plates, installation drawings; G

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation

with relation to the building construction.

SD-03 Product Data

Access doors and panels

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A 36/A 36M.

2.1.2 Anchor Bolts

ASTM A 307. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

2.1.2.1 Lag Screws and Bolts

ANSI B18.2.1, type and grade best suited for the purpose.

2.1.2.2 Toggle Bolts

ANSI B18.2.1.

2.1.2.3 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307.

2.1.2.4 Powder Driven Fasteners

Follow safety provisions of ANSI A10.3.

2.1.2.5 Screws

ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3.

2.1.2.6 Washers

Provide plain washers to conform to ASME B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

2.1.3 Aluminum Alloy Products

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B

26/B 26M or ASTM B 108 for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.2 FABRICATION FINISHES

2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A 123/A 123M, ASTM A 153/A 153Mor ASTM A 653/A 653M, G90, as applicable.

2.2.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Shop Cleaning and Painting

2.2.3.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints, but coat with rust preventative applied in the shop.

2.2.3.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

2.2.4 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.5 Aluminum Surfaces

2.2.5.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.5.2 Unexposed Sheet, Plate, and Extrusions

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF-45, or AA 46.

PART 3 EXECUTION

3.1 INSTALLATION

Install items at locations indicated, according to manufacturer's instructions. Items listed below require additional procedures.

3.2 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.3 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

3.5.2 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

-- End of Section --

SECTION 07920

JOINT SEALANTS
10/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2000) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM D 1056	(2000) Flexible Cellular Materials - Sponge or Expanded Rubber

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealants

Primers

Bond breakers

Backstops

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS

The ambient temperature shall be within the limits of 40 and 90 degrees F when sealant is applied.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

PART 2 PRODUCTS

2.1 SEALANTS

Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

2.1.1 Interior Sealant

ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) and color(s) of sealant shall be as follows:

	LOCATION	COLOR
a.	Small voids between walls or partitions and adjacent door frames, built-in or surface-mounted equipment and fixtures, and similar items.	As selected
b.	Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	As selected
c.	Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	As selected
d.	Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	As selected

2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C 920, Type S or M, Grade P, Class 25, Use T. Location(s) and color(s) of sealant shall be as follows:

	LOCATION	COLOR
a.	Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	As selected
b.	Expansion and control joints.	As selected

	LOCATION	COLOR
c.	Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	As selected
d.	Voids where items pass through exterior walls.	As selected
e.	Metal-to-metal joints where sealant is indicated or specified.	As selected
f.	Joints between ends of gravel stops, fascias, copings, and adjacent walls.	As selected

2.1.3 Floor Joint Sealant

ASTM C 920, Type S or M, Grade P, Class 25, Use T. Location(s) and color(s) of sealant shall be as follows:

	LOCATION	COLOR
a.	Seats of metal thresholds for exterior doors.	As selected
b.	Control and expansion joints in floors, slabs, and walkways.	As selected

2.1.4 Preformed Sealant

Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, the sealant shall be non-bleeding and shall have no loss of adhesion.

2.1.4.1 Foam Strip

Foam strip shall be polyurethane foam; cross-section dimensions shall be as required. Foam strip shall be capable of sealing out moisture, air, and dust when installed and compressed as recommended by the manufacturer. Service temperature shall beminus 40 to plus 275 degrees F. Untreated strips shall be furnished with adhesive to hold them in place. Adhesive shall not stain or bleed into adjacent finishes. Treated strips shall be saturated with butylene waterproofing or impregnated with asphalt.

2.2 PRIMERS

Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.4 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.4.1 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I Type I preformed rods or tubes.

2.4.2 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces shall be clean, dry to the touch, and free from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

3.1.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.1.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.4 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, masonry or stone:		
1/4 inch (minimum)	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
Over 1/2 inch to 2 inches	1/2 inch	5/8 inch
Over 2 inches	(As recommended by sealant manufacturer)	

b. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

3.3.2 Masking Tape

Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

3.3.3 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated.

b. Where backstop is not indicated but joint cavities exceed the

acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios."

3.3.4 Primer

Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

3.3.5 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

3.3.6 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

-- End of Section --

SECTION 08110

STEEL DOORS AND FRAMES

05/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.6	(1997) Hardware on Steel Doors (Reinforcement - Application)

ASTM INTERNATIONAL (ASTM)

ASTM A 591	(1998) Steel Sheet, Electrolytic Zinc-Coated, for Light
ASTM A 653/A 653M	(2003) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C 578	(2003a) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 59/C 59M1	(2001) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(2000a) Mineral Fiber Block and Board Thermal Insulation
ASTM D 2863	(2000) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A115	(Set - Spec dates Vary) Steel Preparation Standards (Incl A115.1 (1990), A115.2 (1987), A115.4 (1994), A115.5 (1992), A115.6 (1993), A115.12 (1994), A115.13 (1991), A115.14 (1994), A115.15 (1994), A115.16 (1990), A115.17 (1994), A115.18 (1994)

STEEL DOOR INSTITUTE (SDI)

SDI 105	(2001) Recommended Erection Instructions for Steel Frames
SDI 113	(2001) Determining the Steady State Thermal Transmittance of Steel Door and Frame Assemblies
SDI A250.8	(2003) Standard Steel Doors and Frames

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors; G

Frames; G

Accessories

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors; G

Schedule of frames; G

Submit door and frame locations.

SD-03 Product Data

Doors; G

Frames; G

Accessories

Weatherstripping

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to SDI A250.8 requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and

wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

SDI A250.8, except as specified otherwise. Prepare doors to receive hardware specified in Section 08710 DOOR HARDWARE. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1 3/4 inches thick, unless otherwise indicated.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Maximum Duty Doors

SDI A250.8, Level 4, physical performance Level A, Model 2 with core construction as required by the manufacturer for indicated exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation. Provide Level 4 for all doors.

2.2 ACCESSORIES

2.3 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI 113 and shall conform to:

a. Rigid Polyurethane Foam: ASTM C 59/C 59M1, Type 1 or 2, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or

b. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II; or

c. Mineral board: ASTM C 612, Type I.

2.4 STANDARD STEEL FRAMES

SDI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors unless otherwise indicated.

2.4.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock and continuously weld stops and rabbets throughout jamb depth. Grind welds smooth.

2.4.2 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.4.2.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

2.4.2.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.5 WEATHERSTRIPPING

As specified in Section 08710 DOOR HARDWARE.

2.6 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI A250.8 and ANSI A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI A250.8, as applicable. Punch door frames, with the exception of frames that will have weatherstripping to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.7 FINISHES

2.7.1 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate all doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A 924/A 924M and ASTM A 653/A 653M. The Coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in SDI A250.8.

2.7.2 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A 591, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in SDI A250.8.

2.8 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 1/8 inch larger than the actual masonry thickness. Design other frames in exposed masonry

walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.

2.8.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. When an additive is provided in the mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in SDI A250.8. After erection and glazing, clean and adjust hardware.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION 08331N

ROLLING SERVICE DOORS
02/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 653/A 653M	(2003) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Rolling service doors; G

SD-03 Product Data

Rolling service doors; G

SD-08 Manufacturer's Instructions

Rolling service doors

Submit manufacturer's currently recommended installation procedures for doors with the shop drawings.

SD-10 Operation and Maintenance Data

Rolling service doors, Data Package 2.

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA. Include wiring diagrams.

1.3 DELIVERY AND STORAGE

Protect doors and accessories from damage during delivery, storage, and handling. Clearly mark manufacturer's brand name. Store doors in dry locations with adequate ventilation, free from dust and water, and in such a manner as to permit access for inspection and handling. Handle doors

carefully to prevent damage. Remove damaged items that cannot be restored to like-new condition and provide new items.

PART 2 PRODUCTS

2.1 ROLLING SERVICE DOORS

Shall be spring counterbalanced, rolling type, and shall be designed for use on exterior openings, as indicated. Doors shall be operated by hand chain with gear or sprocket reduction. Doors shall be complete with guides, hardware, fastenings, operating mechanisms, and accessories. Doors shall be surface-mounted type with guides at jambs set back a sufficient distance to provide a clear opening when door is in open position. Doors, hardware, and anchors shall be designed to withstand a wind pressure of 20 pounds per square foot of door area without damage. Exterior doors shall be mounted on interior side of walls.

2.2 FABRICATION

2.2.1 Curtains

Shall be formed of interlocking galvanized steel slats of shapes standard with the manufacturer, except that slats for exterior doors shall be flat type. Curtain shall roll up on a barrel supported at head of opening on brackets and be balanced by a torsional spring system in the barrel. Slats for doors shall be not lighter than 20 gage.

2.2.2 Endlocks

The ends of each slat or each alternate slat shall have malleable iron or galvanized steel endlocks of manufacturer's stock design.

2.2.3 Bottom Bar

The curtain shall have a steel bottom bar consisting of two angles of equal weight, one on each side, or an equivalent extruded aluminum section, fastened to bottom of curtain. Do not use aluminum on doors more than 16 feet wide. In addition, exterior doors shall have a compressible and replaceable rubber, neoprene, or vinyl weather seal attached to bottom bar.

2.2.4 Guides

Steel structural shapes or formed steel shapes fastened to wall with steel shapes not less than 3/16 inch thick. Guides shall be of sufficient depth or shall incorporate a steel locking bar to retain the curtain in place under the wind pressure specified. Provide continuous vinyl or neoprene weather seals on guides at exterior doors. Securely attach guides to adjoining construction with not less than 3/8 inch diameter bolts, spaced near each end and not over 30 inches apart.

2.2.5 Barrel

Steel pipe or commercial welded steel tubing of proper diameter and thickness for the size of curtain. Deflection shall not exceed 0.03 inch per foot of span. Close ends of barrel with cast-iron plugs, machined to fit the pipe and either pinned or attached with screws in the spring barrel, except that drive end plug may be steel welded in place. Welding shall not be used on the tension end. Install within the barrel an oil-tempered, stress relieved, helical, counterbalancing steel spring,

capable of producing sufficient torque to assure easy operation of the door curtain from any position. At least 80 percent of the door weight shall be counterbalanced at any position. Spring-tension shall be adjustable without removing the hood.

2.2.6 Brackets

Fabricate of steel plate or heavy cast iron to support the barrel, curtain, and operator and to form a supporting ring and end closure for the hood. Provide prelubricated, self-aligning ball bearings, shielded or sealed.

2.2.7 Hoods

Steel, not lighter than 24 gage formed to fit contour of end brackets and reinforced with steel rods, or rolled beads at top and bottom edges. Hoods shall have intermediate supporting brackets. Provide a weather baffle at the lintel or inside the hood of each exterior door.

2.2.8 Locking Device

For each manually operated exterior rolling door provide manufacturer's standard chain- or bar-type locking device on the inside. The locking device shall be of type to receive a padlock with a 5/16 inch diameter shackle.

2.3 MANUAL OPERATION

2.3.1 Manual Hand-Chain Operation

Provide galvanized, endless chain operating over a sprocket and extending to within 3 feet of floor. Obtain reduction by use of roller chain and sprocket drive or suitable gearing. Gears shall be high-grade gray iron, cast from machine-cut patterns. The pull required to operate the door shall not exceed 35 pounds.

2.4 FINISHES

Slats, steel bottom bars, and hoods shall be hot-dip galvanized, shop primed and factory finished. Shop prime other parts of coiling doors, except faying surfaces.

2.4.1 Primed Finish

Clean surfaces thoroughly, treat to assure maximum paint adherence, and provide a factory dip or spray coat of rust-inhibitive metallic oxide or synthetic resin primer on exposed surfaces.

2.4.2 Galvanized Shop-Primed and Finish Coat

Surfaces specified shall have a zinc coating, a phosphate treatment, and a shop prime coat of rust-inhibitive paint. The galvanized coating shall conform to ASTM A 653/A 653M, coating designation G90, for steel sheets, and ASTM A 123/A 123M for iron and steel products. The weight of coatings for products shall be as designated in Table I of ASTM A 123/A 123M for the thickness of base metal to be coated. The prime coat shall be a type especially developed for materials treated by phosphates and adapted to application by dipping or spraying treated for paint adhesion and shall receive a factory baked-on finish coat. Color to be dark bronze.

PART 3 EXECUTION

3.1 INSTALLATION

Install doors in accordance with approved detail drawings and manufacturer's directions. Locate anchors and inserts for guides, brackets, hardware, and other accessories accurately. Upon completion, doors shall be weathertight and shall be free from warp, twist, or distortion.

3.2 FINAL ADJUSTMENT

Doors shall be lubricated and properly adjusted to operate freely.

-- End of Section --

SECTION 08710

DOOR HARDWARE
02/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1	(2000) Butts and Hinges
BHMA A156.13	(2002) Mortise Locks & Latches, Series 1000
BHMA A156.16	(2002) Auxiliary Hardware
BHMA A156.21	(2001) Thresholds
BHMA A156.4	(2000) Door Controls - Closers
BHMA A156.6	(2001) Architectural Door Trim

1.2 SUBMITTALS

Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Manufacturer's Catalog Data

Hardware items; G

SD-06 Manufacturer's Instructions

Installation

SD-07 Schedules

Hardware Schedule; G

SD-10 Operation and Maintenance Data

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (If fire rated and listed)	ANSI/ BHMA Finish Designation

1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (AA1, AA2, etc.).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Hardware to be applied to metal (or to prefinished doors) shall be made to template. Promptly furnish template information or templates to door and frame manufacturers.

2.2 HARDWARE ITEMS

Hinges, pivots, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.2.1 Hinges

BHMA A156.1, 4 1/2 by 4 1/2 inches unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed.

2.2.2 Locksets

2.2.2.1 Mortise Locks and Latches

BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide

mortise locks with escutcheons not less than 7 by 2-1/4 inches with a bushing at least 1/4 inch long. Cut escutcheons to suit cylinders and provide trim item with straight, beveled or smoothly round sides, corners and edges. Levers and roses of mortise locks shall have screwless shanks and no exposed screws.

2.2.3 Cylinders and Cores

Provide cylinders for new locks, including locks provided under other sections of this specification. Cylinders and cores shall have seven pin tumblers. Cylinders and cores shall be the product of one manufacturer. All cylinders and cores shall be interchangeable and requires removal by a special control key. All cores shall be compatible with projects existing best key system.

2.2.4 Keying System

This will be an interchangeable core key system to match the existing requirements. Provide temporary cores with six (6) operating keys and two (2) control keys for contractors use during construction. Permanent cores will be shipped direct to the Contracting Officer along with all permanent keys. Stamp all change keys with key control symbol. Stamp core with key control symbol in a concealed place on the core.

2.2.5 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.2.5.1 Lever Handles

Provide lever handles in lieu of knobs if required. Lever handle locks shall have a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when a force in excess of that specified in BHMA A156.13 is applied to the lever handle. Lever handles shall return to within 1/2 inch of the door face.

2.2.6 Keys

Furnish one file key, one duplicate key, and one working key for each key change. Furnish one additional working key for each lock of each keyed-alike group. Furnish three (3) permanent control keys.

2.2.7 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C, 4G & 4H. Furnish with covers. Provide with brackets, arms, mounting devices and factory fasteners. Provide multi-size closers. Provide manufacturer's 10 year warranty.

2.2.8 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Manual flush bolts: BHMA A156.16, Type L14081. Automatic latching flush bolts: BHMA A156.3, Type 25.

2.2.9 Door Protection Plates

BHMA A156.6. Width for single doors shall be 2 inches less than door width. Pairs of doors without center mullions shall be 1 inch less than door

width. Height of kick plates shall be 10 inches for flush doors and 1 inch less than height of bottom rail for panel doors. Plates shall be .050 in thickness.

2.2.10 Door Stops

BHMA A156.16. Provide types L22141 and L52251 as required.

2.2.11 Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door and two for each pair.

2.2.12 Thresholds

BHMA A156.21. Review details on plans to determine types required.

2.2.13 Weather Stripping

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts.

2.2.14 Rain Drips

Bottom drips shall be approximately 1 1/2 inches high by 5/8 inch projection. Align bottom with bottom edge of door. Overhead drips shall be approximately 1 1/2 inches high by 2 1/2 inches projection with length equal to overall width of door frame.

2.2.15 Special Tools

Provide special tools, such as spanner and socket wrenches required to service and adjust hardware items.

2.3 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware.

2.4 FINISHES

BHMA A156.18. Hardware shall have BHMA 630 finish, (satin stainless steel), unless specified otherwise except items not manufactured in stainless shall have BHMA 626 finish (satin chromium plated). Closers shall be BHMA 689 finish, (sprayed aluminum lacquer). Thresholds, weather-stripping and related items to be anodized clear aluminum.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws.

3.2 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Adjust hinges, locks, latches,

bolts, holders, closers, and other items to operate properly. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.3 HARDWARE SETS

HW-1

3 EA HINGES	A2112 NRP 4 1/2" X 4 1/2" 630
1 EA LOCKSET	1000 GRD 1 F12 630
1 EA CLOSER	C02011 OR 2021 PT4C, 4H 689 TBGN
1 EA KICK PLATE	J102 .050 10" X 2" LDW 630
1 EA STOP	L02011 OR L02131 626 AS REQ'D
1 EA THRESHOLD	SEE THRESHOLD DETAILS
1 SET WHSTP	NGP 133NA @ HD & JAMB
3 EA SILENCERS	L03011 GRAY

NOTE: PROVIDE O/H RAIN DRIP NGP 16A AND BOTTOM DRIP 17A FOR OUT SWINGING DOORS.

-- End of Section --

SECTION 09900

PAINTS AND COATINGS
11/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100Doc	(2001) Documentation of the Threshold Limit Values and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 235	Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D 523	(1999) Standard Test Method for Specular Gloss
ASTM C 669	(1995) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash
ASTM D 2092	(1995) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM D 4263	(1983; R 1999) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM F 1869	(1998) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1025	Lead
29 CFR 1926.62	Lead Exposure in Construction

FEDERAL STANDARDS (FED-STD)

FED-STD-313	(Rev. C) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MASTER PAINTERS INSTITUTE (MPI)

MPI 77	(2001) Epoxy Cold Cured, Gloss
MPI 79	(2001) Marine Alkyd Metal Primer
MPI 107	(2001) Rust Inhibitive Primer (Water-Based)

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP01-01	(2001) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Guide 6	(1997) Containing Debris Generated During Paint Removal Operations
SSPC Guide 7	(1995) Disposal of Lead-Contaminated Surface Preparation Debris
SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC Guide 3	(1995) Safety in Paint Application
SSPC SP 1	(1982) Solvent Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP01-01 shall be given preferential consideration over registered products. Products that are

registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating

Manufacturer's Technical Data Sheets

Sealant

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings G

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings:

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of

three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that confrom to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing

may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystilline silica.

1.5.7 Human Carcinogens

Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at

temperatures between 40 to 95 degrees F.

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525,"Safety Requirements" and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC Guide 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100Doc, threshold limit values.

d. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 for surface preparation on painted surfaces containing lead. Additional guidance is given in SSPC Guide 6 and SSPC Guide 7. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.

1.8 ENVIRONMENTAL CONDITIONS

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.9 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Architect. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be as indicatedon drawings.

1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

1.10.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Exterior Painting

Includes new surfaces, existing coated surfaces, of the buildings and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

1.10.1.2 Interior Painting

Includes new surfaces and existing coated surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

c. Expand steel structure over shop prime surfaces.

1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

f. Pre-engineered building pre-fabricated components.

1.10.3 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

1.10.4 Definitions and Abbreviations

1.10.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.10.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.10.4.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as

primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.4.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.4.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.4.7 EXT

MPI short term designation for an exterior coating system.

1.10.4.8 INT

MPI short term designation for an interior coating system.

1.10.4.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.10.4.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.10.4.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.10.4.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	

G7 High Gloss

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.10.4.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.10.4.14 Paint

See Coating definition.

1.10.4.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.10.4.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 REPUTTYING AND REGLAZING

Remove cracked, loose, and defective putty or glazing compound on glazed sash and provide new putty or glazing compound. Where defective putty or glazing compound constitutes 30 percent or more of the putty at any one light, remove the glass and putty or glazing compound and reset the glass. Remove putty or glazing compound without damaging sash or glass. Clean rabbets to bare wood or metal and prime prior to reglazing. Putty for wood sash shall be a linseed oil putty. Glazing compound for metal sash shall conform to ASTM C 669. Patch surfaces to provide smooth transition between existing and new surfaces. Finish putty or glazing compound to a neat and

true bead. Allow glazing compound time to cure, in accordance with manufacturer's recommendation, prior to coating application. Allow putty to set one week prior to coating application.

3.3 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primmed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.3.1 Additional Requirements for Preparation of Surfaces With Existing Coatings (Exposed Pre-Engineered Building Structure)

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

a. Wipe previously painted surfaces to receive solvent-based coatings, with a clean, dry cloth saturated with mineral spirits, ASTM D 235. Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.

b. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.

c. The requirements specified are minimum. Comply also with the application instructions of the paint manufacturer.

d. Previously painted surfaces specified to be repainted and those damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

e. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.

f. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8.

g. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.

h. Edges of chipped paint shall be feather edged and sanded smooth.

i. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.

j. New, proposed coatings shall be compatible with existing coatings.

3.3.2 Existing Coated Surfaces with Minor Defects

Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings.

3.3.3 Substrate Repair

a. Repair substrate surface damaged during coating removal;

b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and

c. Clean and prime the substrate as specified.

3.4 PREPARATION OF METAL SURFACES

3.4.1 Galvanized Surfaces

a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.5 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.5.1 Concrete and Masonry

a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cuphousehold detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.

(2) Fungus and Mold: Wash new, existing coated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the

surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.6 APPLICATION

3.6.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases,

mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

e. Floors: For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat.

3.6.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

3.6.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.6.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.8 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.9 PAINT TABLES

All DFT's are minimum values.

3.9.1 EXTERIOR PAINT TABLES

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. Existing, previously painted Concrete masonry:

B. New concrete masonry units, unless otherwise specified:

1. Epoxy
MPI RIN 4.2D-G6 (Gloss)

Spot Primer:	Intermediate:	Topcoat:
MPI 77	MPI 77	MPI 77

System DFT: 5 mils

DIVISION 5: EXTERIOR AND INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

EXTERIOR AND INTERIOR STEEL / FERROUS SURFACES

A. Metal, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. Interior Metal: Alkyd
MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT: 5.25 mils

2. Exterior Metals: Alkyd
MPI INT 5.1D-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94

System DFT: 5.25 mils

B. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

-- End of Section --

SECTION 10990

MISCELLANEOUS SPECIALTIES
07/02

PART 1 GENERAL

1.1 SUBMITTALS

1.1.1 SD-02, Manufacturer's Catalog Data G

1.1.2 SD-03, Manufacturer's Standard Color Charts G

1.1.3 SD-04, Drawings G

1.2 DELIVERY, HANDLING AND STORAGE

Deliver materials to project site in the manufacturer's original, unopened and undamaged packages with labels legible and intact. Provide labels to indicate the manufacturer, brand name, size, finish and placement location. Store folding partitions and accessories in unopened packages in manner that will prevent damage. Handle partition material in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) WALL PANEL

Furnish and install pebbled surfaced wall panels 3/32 inch thick in longest lengths available in white color as manufactured by Marlite, 202 Harger Street, Dover, Ohio. Provide neccessary trim molding, outside and inside corners and base moldings, as required

PART 3 EXECUTION

3.1 FIBERGLASS REINFORCED PLASTIC (FRP) WALL PANELS

Install using manufacturer's recommended adhesives and printed installation instructions.

-- End of Section --

SECTION 11071

DRIVE-THRU FLEET WASHER AND MISCELLANEOUS EQUIPMENT
05/05

PART 1 GENERAL

1.1 CAPABILITY

Fleet maintenance, capable of washing front, sides, under carriage and rear of large vehicles. Designed to for individual customers' requirements. The washer shall remove all visible, heavy dirt accumulation from all surfaces of the vehicle. This system shall be fully automatic by means of infrared fiber optic beams, starters and overloads. If needed, washer controls may be overridden at any time by manual controls as may be desired for concentrated washing action. Specifications for equipment contained herein and as indicated on drawings are based on "Sprite Wash System" equipment manufactured by Whiting Systems, Inc., 9000 Highway 5 North, Alexander, Arkansas 72002, 501-847-9031.

1.2 OPERATION

Vehicle enters wash bay 40-50fpm which breaks first set of beams which then activates soap arches throughly cleaning front, sides, under carriage and rear of vehicle. Optional Step-2 arch is then activated for another soap application. The vehicle then breaks beams for the high-pressure spinner arch. In entry of arch, the spinners rotate towrds the front of the vehicle and as the rear of the vehicle nears the exit of the arch, the spinners rotate back towards the rear of the vehicle. The vehicle then breaks the beams at the rinse arch for the final phase before exiting the bay. Side brushes and indercarriage wash can be added to this process.

1.3 FRAME CONSTRUCTION AND FEATURES

The frame shall be constructed of welded stainless stell tube and stainless steel angle iron. Stainless steel construction stress points shall be reinforced and double welded. The frame of the spinner arch shall be covered with stainless steel sheets and vinyl coated nylon splash shields shall be provided around side brushes to prevent excessive water spray. All bolts, rivets, and fasteners shall be constructed of stainless steel. Operating components shall be easily accessible within the frame for maintenance.

1.3.1 Motors and Bearings

All motors shall be totally enclosed, squirrel cage type, continuous duty wash-down rated stainless steel motors. Each motor shall be individually protected by manual reset adjustable range thermal overload relays with bimetallic, ambient compensated operation. Motor starter and control relays shall be heavy-duty industrial type, rated for 600 volts. All bearings must be non-lubricating and completely scaled.

1.3.2 Brushes

All brushes shall be made of polyethylene filaments and all brush ends shall be feathered to prevent damage to vehicle surface areas. All brushes shall be separately replaceable in no longer than 12" sections for brush

wear. Side brushes shall be 42" in diameter respectively. All brush shafts shall be 4 1/2 inches in diameter, flange bearing mounted, direct worm gear drive. A brush shaft with 3 1/2 inch diameter is not acceptable. Brush rotations shall not exceed 125 rpm to prevent damage to the vehicle finishes and obstacles.

1.3.3 Spinner System

The wash shall have thirteen (13) motor drive spinners on the gantry, five (5) on both sides and three (3) on top. The spinner system shall be motor driven, connecting all spinners by rubber cord reinforced timing belts. The motors shall be controlled by a variable speed drive (AC inverter). Water or hydraulic driven spinners are not acceptable. Spinner assemblies must be mounted on rotary unions, shaft mounted bearings are not acceptable. Each spinner head shall consist of three (3) zero degree, air-injected nozzles, that can effectively wash vehivles seven (7) feet away. Rach spinner shall rotate against the water stream to eliminate the problems with destroying decals. Spinner shall be mounted on sub-assemblies for easy maintenance.

1.3.4 Detergent Coverage

Detergent coverage on the front and rear of vehicles shall be achieved by toggle between soap arches, alternating the direction of the soap nozzles. The toggling shall be acheived through use of an air-actuated valve.

1.3.5 Piping and Nozzles

Piping shall include 3/4 inch schedule 80 pipe with 19 spray nozzles for detergent application and rinse cycles. Rotating spinners shall utilize 1 1/2 inch galvanized schedule 40 piping. All water nozzles and pipes shall be separately removable for cleaning purposes.

1.3.6 Compressed Air System

The washer shall be capable of operating with 80 to 120 PSI, 3 CFM, air pressure through 3/8 inch air line. All air hoses/air components shall require no lubrication and shall be NFPA designed for continuous duty. Air cylinders shall be constructed from hard anodized aluminum and utilize carboxilated nitrile with Teflon piston seals. Air control components shall be located behind access panel and the main air hose shall have an automatic water filtration system.

1.3.7 Controls

The control panel shall have numbered terminal strips for ecterial wriring. Push buttons and selector switches shall be rated NEMA 4X. Internal wiring shall utilize conduits. Limit switches are not acceptable. Thermal overloads and motor starters shall be equipped with auxiliary contacts to switch off control circuit in event of any motor failure. The elctrical control system shall be hardwired with a master control relay circuit for positive electrical disengagement, so all circuits will de-energize when the stop button is pressed for maximum safety. A separate power push button shall re-engage the master control relay for operation.

1.3.8 Program Logic Controller (PLC)

The PLC shall include input and output modules and be ready for modem interface to permit the ladder program to be accessed directly from the

factory in case of a breakdown. Moderm shall be included and installed from factory. Batteries located in the local control panel shall automatically provide power to the main PLC in case of power failure and shall be capable of maintaining all software in memory for duration of four (4) hours. During the duration of the power failure, the software program and associated processes residing within the PLC shall not be lost and after power is restored, the backup battery shall be auotmatically capable of being charged to its maximum level.

1.3.9 Final Rinse Arch

Frame mounted, self-standing, automatic fresh water rinse arch shall be provided at wash bay exit. The rinse shall have a minimum of 19 brass spray nozzles threaded into 1 inch galvanized schedule 40 pipe arranged to provide full rinsing coverage with fresh water over entire vehicle and capable of delivering 20 gallons per minute at 200 PISI> Piping shall be supported by a frame constructed of 2 x 2 x 1/8 inch stainless steel structural tubing welded to four (4) stainless steel base plates.

1.3.10 Water Supply System

Includes wash pumps, electrical panels, detergent distribution system, and miscellaneous equipment to fully support washer operation.

a. Pump skid: The main electrical panel shall be factory plumbed and wired and located on the pump skid along with the following pumps:

1. High-pressure: 40 HP, 140 GOPM at 390 PSI. Multi-stage centrifugal, motor-stacked, chamber and impeller design, 80% efficient pump with water-resistent bearings and cartridge shaft seals.

2. Wash water: 5 HP, 20 GPM at 200 PSI. Multi-stage centrifugal, motor-stacked, chamber and impeller design, 80% efficient pump with water-resistant bearings and bellow shaft seals.

b. Detergent distribution system: Multiple washer detergent distribution system, consisting of chemical metering pumps and a bulk storage tank, shall be capable of injecting pre-soak detergents to pressure side of wash water pump. Metering pumps injecting detergents to suction side of wash water pump are not acceptable. Detergent storage tank shall be made of hig-density polypropylene.

1.3.11 Water Reclaim System

System shall feature a 90 GPM maximum output with 5 HP continuous duty rated, self-priming bronze impeller stainless steel shaft processing pump. Unit shall include debris trap of 8 inch stainless steel removal basket and a process filtration with stainless steel element 25 micron absolute process rating with self-cleaning system based upon system initiated air purge. Provide reverse osmosis system package with twin alternating water softness and carbon filters.

1.3.12 Electric Pressure Washer

Electrically operated 5 HP motor, 4 GPM at 2,000 PSI. Packaged heated pressure washer with belt-driven oil-bath plunger pump. Unit is gun activated start/stop system with solid state time delay with downstream chemical injection. Provide two (2) guns and two (2) 50 foot hoses with

hose reels installed and hooked-up in areas as indicated by Government.

1.3.13 Electrical System

The entire wash system, pump skids and water reclamation system if needed shall be pre-wired and factory tested, except for field wiring to accommodate shipping. Electrical components shall be U.L. approved. Factory construction and installation shall meet Division 16 specification requirements. Provide wire markings and labeling per Division 16.

1.3.14 Industrial Vacuum Cleaner

Furnish and install an industrial stainless steel vacuum with timer, Model 822-100-1340T-3, as manufactured by Clear Stream COmpany, Inc., as indicated on drawings.
Unit shall be supplied with the following:

a, Three 1.6 hp two stage bypass coded industrial motors.
b. 18 gauge stainless steel dome.
c. Push button on/off with adjustable timer.
d. 2" 30 foot hose; threaded hose connection for a tight seal.
e. 14 gauge top for tight seal for motors.
f. 18 gauge 304 stainless steel body.
g. 2 double latch doors with lock rings.
h. 4 bag inverted filter system.
i. Claw tool.
j. Vinyl bagliner.
k. Crevice tool with swivel cuff.
l. Input: 23 Amp, 120V 60 Hz.
m. Size: 19" diameter housing, 50"H x 27"D overall.
n. Weight: 105 lbs ±

-- End of Section --

SECTION 15050N

BASIC MECHANICAL MATERIALS AND METHODS
09/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B 117	(2002) Operating Salt Spray (Fog) Apparatus

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(1998) Motors and Generators
NEMA MG 10	(2001) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Ocage Polyphase Induction Motors
NEMA MG 11	(1977; R 1997; R 2001) Energy Management Guide for Selection and Use of Single Phase Motors

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 15, "Mechanical" of this project specification, unless specified otherwise in the individual section.

1.3 QUALITY ASSURANCE

1.3.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.3.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

1.3.3 Service Support

The equipment items shall be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.3.4 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.3.5 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction", or words of similar meaning, to mean the Contracting Officer.

1.3.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall." Reference to the "code official" shall be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "owner" shall be interpreted to mean the "Contracting Officer." For leased facilities, references to the "owner" shall be interpreted to mean the "lessor." References to the "permit holder" shall be interpreted to mean the "Contractor."

1.3.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of Chapter 1, "Administrator," do not apply. These administrative requirements are covered by the applicable Federal Acquisition Regulations (FAR) included in this contract and by the authority granted to the Officer in Charge of Construction to administer the construction of this project. References in the ICC Codes to sections of Chapter 1, shall be applied appropriately by the Contracting Officer as authorized by his administrative cognizance and the FAR.

1.4 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.5 ELECTRICAL INSTALLATION REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.5.1 New Work

Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 16, except internal wiring for components of package equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.

1.5.2 High Efficiency Motors

1.5.2.1 High Efficiency Single-Phase Motors

Unless otherwise specified, single-phase fractional-horsepower alternating-current motors shall be high efficiency types corresponding to the applications listed in NEMA MG 11.

1.5.2.2 High Efficiency Polyphase Motors

Unless otherwise specified, polyphase motors shall be selected based on high efficiency characteristics relative to the applications as listed in NEMA MG 10. Additionally, polyphase squirrel-cage medium induction motors with continuous ratings shall meet or exceed energy efficient ratings in accordance with Table 12-6C of NEMA MG 1.

1.5.3 Three-Phase Motor Protection

Provide controllers for motors rated one one horsepower and larger with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.

1.6 INSTRUCTION TO GOVERNMENT PERSONNEL

When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work.

Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than

4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system.

When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.7 ACCESSIBILITY

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF NEW EQUIPMENT

New equipment painting shall be factory applied or shop applied, and shall be as specified herein, and provided under each individual section.

3.1.1 Factory Painting Systems

Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall withstand 500 hours in a salt-spray fog test. Salt-spray fog test shall be in accordance with ASTM B 117, and for that test the acceptance criteria shall be as follows: immediately after completion of the test, the paint shall show no signs of blistering, wrinkling, or cracking, and no loss of adhesion; and the specimen shall show no signs of rust creepage beyond 0.125 inch on either side of the scratch mark.

The film thickness of the factory painting system applied on the equipment shall not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use on surfaces subject to temperatures above 120 degrees F, the factory painting system shall be designed for the temperature service.

3.1.2 Shop Painting Systems for Metal Surfaces

Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees F shall be cleaned to bare metal.

Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

a. Temperatures Less Than 120 Degrees F: Immediately after cleaning,

the metal surfaces subject to temperatures less than 120 degrees F shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.

b. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

c. Temperatures Greater Than 400 Degrees F: Metal surfaces subject to temperatures greater than 400 degrees F shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

-- End of Section --

SECTION 15080N

MECHANICAL INSULATION
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 209	(2002a) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C 1136	(2003) Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C 195	(2000) Mineral Fiber Thermal Insulating Cement
ASTM C 534	(2003) Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C 547	(2003) Mineral Fiber Pipe Insulation
ASTM C 916	(1985; R 2001e1) Adhesives for Duct Thermal Insulation
ASTM E 84	(2003) Surface Burning Characteristics of Building Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 255	(2000) Method of Test of Surface Burning Characteristics of Building Materials

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-A-3316	(Rev. C; Am. 2) Adhesives, Fire-Resistant, Thermal Insulation

UNDERWRITERS LABORATORIES (UL)

UL 723	(1996; Rev thru Sep 2001) Test for Surface Burning Characteristics of Building Materials

1.2 QUALITY ASSURANCE

Provide new field-applied insulation for piping systems which are located within, on, under, and adjacent to buildings; and for plumbing systems.

1.2.1 Packaging and Labeling

Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to project site shall have manufacturer's stamp or label attached giving name of manufacturer, brand and description of material. Insulation packages and containers shall be asbestos-free.

1.2.2 Surface Burning Characteristics

Materials shall have a flame-spread rating of not more than 25 and a smoke-developed rating of not more than 50, when tested in accordance with NFPA 255, ASTM E 84 or UL 723. Insulation materials located exterior to the bilding perimeter are not required to be fire-rated.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Accessory materials

Adhesives, sealants, and coating compounds

Piping insulation

Piping insulation jackets

1.4 RECYCLED MATERIALS

Provide thermal insulation containing recycled materials to the extent practicable, provided that the materials meets all other requirements of this section. The minimum recycled material content of the following insulation are:

Rock Wool - 75 percent slag of weight
Fiberglass - 20-25 percent glass cullet by weight
Phenolic Rigid Foam - 5 percent recovered material
Plastic Rigid Foam - 9 percent recovered material
Polyiscocyanurate/Polyurethane - 9 percent recovered material
Rigid Foam - 9 percent recovered material

PART 2 PRODUCTS

2.1 PIPING INSULATION

Insulation material shall conform to Table 1. Insulation thickness shall be as listed in Table 2. Except for flexible cellular insulation, insulation thickness as specified in Table 2 shall be 1 inch greater for insulated piping systems located in unheated spaces. Insulation exterior shall be factory cleanable, grease resistant, non-flaking and non-peeling.

2.1.1 Piping Insulation Jackets

2.1.1.1 All-Purpose Jacket

Provide insulation with insulation manufacturer's standard reinforced fire retardant jacket with or without integral vapor barrier as required by the service. Provide jackets in exposed locations with a white surface suitable for field painting.

2.1.1.2 Metal Jackets

a. Aluminum Jackets: ASTM B 209, Temper H14, minimum thickness of 27 gage (0.016 inch), with factory-applied polyethylene and kraft paper moisture barrier on inside surface. Provide smooth surface jackets for jacket outside diameters less than 8 inches. Provide corrugated surface jackets for jacket outside diameters 8 inches and larger. Provide stainless steel bands, minimum width of 0.5 inch. Provide factory prefabricated aluminum covers for insulation on fittings, valves, and flanges. Covers shall be same thickness and material as jackets on adjacent piping.

2.2 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

2.2.1 Insulation and Vapor Barrier Adhesive

Provide ASTM C 916, Type I adhesive for securing insulation to metal surfaces and for vapor barrier lap only in building interior.

2.2.2 Lagging Adhesive

MIL-A-3316, Class 1, for bonding fibrous glass cloth to unfaced fibrous glass insulation; for bonding cotton brattice cloth to faced and unfaced fibrous glass insulation board; or for bonding lagging cloth to thermal insulation, or Class 2, for attaching fibrous glass insulation to metal surfaces. Provide for pipe insulation.

2.2.3 Mineral Fiber Insulation Cement

ASTM C 195.

2.2.4 Vapor Barrier Coating

Provide in accordance with insulation manufacturers' recommendations.

2.2.5 Weatherproof Coating

For outside applications provide in accordance with insulation and jacket manufacturer's recommendations.

2.3 ACCESSORY MATERIALS

2.3.1 Staples

ASTM A 167, Type 304 or 316 stainless steel outside-clinch type.

2.3.2 Insulation Bands

1/2 inch wide; 26 gage stainless steel.

2.3.3 Metal Bands

3/8 inch minimum width; 26 gage stainless steel or 24 gage aluminum.

2.3.4 Fibrous Glass Cloth and Tape

Fibrous glass cloth and tape; 20 by 20 maximum size mesh. Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces per square yard. In lieu of glass cloth and tape, open weave glass membrane may be provided.

2.3.5 Wire

Soft annealed stainless steel, 18 gage.

2.3.6 PVC Pipe Fitting Cover and Its Vapor Barrier Tape

Provide PVC fitting covers with insulation inserts of same material and thickness as pipe insulation.

2.3.7 Vapor Barrier Materials

ASTM C 1136. Resistant to flame, moisture penetration, and mold growth, color white.

PART 3 EXECUTION

3.1 PREPARATION

Clean and test mechanical systems prior to application of insulation. Obtain Contracting Officer's written approval before applying field-applied insulation to mechanical systems. Do not insulate the following:

a. Adjacent insulation;

b. ASME stamps;

c. Manufacturer's nameplates;

d. Vibration isolating connections;

3.2 PIPE INSULATION

3.2.1 Pipe Insulation (Except Cellular and Calcium Silicate Insulation)

Place sections of insulation around pipe and joints tightly butted into place. Draw jacket tight and smooth. Secure jacket with fire resistant adhesive, factory-applied self-sealing lap, or stainless steel outward clinching staples spaced not over 4 inches on center (o.c.) and 1/2 inch minimum from edge of lap. Cover circumferential joints with butt strips, not less than 3 inches wide, of material identical to jacket material. Overlap longitudinal laps of jacket material not less than 1 1/2 inches. Adhesive used to secure butt strip shall be same as that used to secure jacket laps. Apply staples to both edges of butt strips.

a. Vapor Barrier Jacket: When a vapor barrier jacket is required, as indicated in Table 1, on ends of sections of insulation that butt against flanges, unions, valves, fittings, and joints, provide a vapor barrier coating or manufacturer's weatherproof coating for

outside service unless pipe is supplied with factory-applied self-seal lap. Apply vapor barrier coating at longitudinal and circumferential laps. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing, stapling, and coating as specified for butt strips. Extend patch not less than 1 1/2 inches past the break in both directions. At penetrations by pressure gages and thermometers, fill voids with vapor barrier coating for outside service. Seal with a brush coat of the same coating. Do not use staples to secure jacket laps on pipes carrying fluid medium at temperatures below 35 degrees F.

3.2.2 Flexible Cellular Insulation

Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral-fiber insulation inserts and sheet-metal sleeves. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions. Apply two coats of acrylic latex or equivalent finish as recommended by insulation manufacturers to flexible unicellular insulation in outside locations. Do not use vinyl lacquer finish or equivalent. Use metal jackets on cellular insulation located outside.

3.2.3 Hangers and Anchors

Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by insulation, provide galvanized steel shields and protection saddles. Where shields are used on pipes 2 inches and larger, provide insulation inserts at points of hangers and supports. Insulation inserts shall be of calcium silicate, cellular glass, minimum 8 pcf, molded glass fiber, minimum 8 pcf, or other approved material of the same thickness as adjacent insulation. Insulation inserts shall cover bottom half of pipe circumference and be not less in length than the protection shield. Vapor-barrier facing of insert shall be of same material as facing on adjacent insulation. Seal inserts into insulation with vapor barrier coating or weatherproof coating as applicable. Where protection saddles are used, fill voids with same insulation material as used on adjacent pipe. Where anchors are secured to chilled piping that is to be insulated, insulate anchors same as piping for a distance not less than four times the insulation thickness to prevent condensation. Vapor seal insulation around anchors.

3.2.4 Sleeves and Wall Chases

Where interior wall penetrates, extend a aluminum jacket 2 inches out on either side of wall and secure on each end with a band. Where floor penetrates, extend a metal jacket from a point below back-up material to a point 10 inches above floor with one band at the floor and one not more than one inchfrom end of metal jacket. Where exterior wall is penetrated, extend metal jacket through sleeve to a point 2 inches beyond interior surface of wall.

3.2.5 Flanges, Unions, Valves and Fittings for Piping

Provide insulation for cold piping and hot piping of 110 degrees F or higher. Factory fabricated removable and reusable insulation covers may be used except with flexible cellular. When nesting size insulation is used, overlap 2 inches or one pipe diameter, whichever is larger. Use insulating cement to fill voids. On pipe sizes larger than 2 1/2 inches, elbows

insulated using segments shall not have less than three segments per elbow. Place and joint segments with manufacturer's recommended water-vapor resistant, fire retardant, and adhesive appropriate for the temperature limit of the service. Overlap tape seams one inch. Extend adhesive onto adjoining insulation not less than two inches. Total dry film thickness shall not be less than 1/16 inch. Where unions are indicated not to be insulated, taper insulation to union at a 45 degree angle. Provide finish coating as follows:

a. Coating with Embedded Glass Tape: Coat insulation and all purpose jacket with two coats of lagging adhesive and with glass tape embedded between coats. Total dry film thickness shall not be less than 1/16 inch. Where unions are indicated not to be insulated, taper insulation to union at a 45 degree angle. For cold piping, seal insulation and jacket with two coats of vapor barrier coating with glass tape embedded between coats. Insulate anchors attached directly to cold pipe for a sufficient distance to prevent condensation but not less than 6 inches from insulation surface.

b. PVC Fitting Covers: Factory premolded one-piece PVC fitting covers may be provided in lieu of two coats of adhesive with tape embedded between coats. Provide factory premolded field-fabricated segment or blanket insert insulation under fitting covers. Install factory premolded one-piece PVC fitting covers over insulation. Secure covers with stapling, taping with PVC vapor barrier tape, or with metal or plastic tacks made for securing PVC fitting covers. Do not provide PVC fitting covers where exposed to weather. Provide PVC fitting covers only in ambient temperatures below 150 degrees F.

3.2.6 Piping Exposed in Pump Room and Washrack

3.2.6.1 Metal Jackets

Provide over insulation. Machine cut jacket to smooth edge of circumferential joints. Overlap jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal joints with a coating recommended by insulation manufacturer for weatherproofing.

3.2.6.2 Flanges, Unions, Valves, Fittings, and Accessories

Insulate and finish as specified hereinbefore for applicable service. Apply two coats of an emulsion type weatherproof mastic for hot service and vapor barrier mastic for cold service recommended by insulation manufacturer. Embed glass tape in the first coat. Overlap tape not less than one inch and the adjoining metal jacket not less than 2 inches.

3.3 FIELD QUALITY CONTROL

Visually inspect to ensure that materials provided conform to specifications. Inspect installations progressively for compliance with requirements.

3.3.1 Piping Systems

Obtain Contracting Officer's written approval of piping systems before

applying field-applied insulation. Piping insulation shall terminate immediately adjacent to each flow control valve, automatic control valve, or device. Seal ends of pipe insulation and space between ends of pipe insulation and piping with waterproof vapor barrier seating.

TABLE 1
Insulation Material For Piping

Service	Material	Spec.	Type	Class	Vapor Barrier Required
Reverse Osmosis (RO) Final Rinse Water(FRW) and Reclaim Water (RW)	Mineral Fiber	ASTM C 547		1	Yes
Hot Domestic Water Supply Piping (HW); (Maximum 200oF)	Mineral Fiber	ASTM C 547		1	No
Cold Domestic Water Piping(FW)	Mineral Fiber	ASTM C 547		1	Yes
Piping Pressure Washer (PW), Spinner Water SUpply (SWS), and Wash Water with Soap (WWS)	Flexible Cellular	ASTM C 534	I		No

TABLE 2
Piping Insulation Thickness (inch)

	Tube And Pipe Size (Inches)	
Reverse Osmosis (RO), Final Rinse Water (FRW), and Reclaim Water (RW)	1/4-1 1/4	1 1/2-3
Piping Mineral Fiber	1	1

TABLE 2
Piping Insulation Thickness (inch)

		Tube And Pipe Size (Inches)	
Reverse Osmosis (RO), Final Rinse Water (FRW), and Reclaim Water (RW)		1/4-1 1/4	1 1/2-3
Hot Domestic Water Supply Piping (HW); Maximum 200oF)	Mineral Fiber	1	1
Cold Domestic Water Piping (FW)	Mineral Fiber	0.75	1
Pressure Washer (PW), Spinner Water Supply (SWS), and Wash Water with Soap (WWS)	Flexible	0.5	1

-- End of Section --

SECTION 15212N

HIGH AND MEDIUM PRESSURE COMPRESSED AIR PIPING
08/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel
AWS Z49.1	(1999) Safety in Welding, Cutting and Allied Processes

ASME INTERNATIONAL (ASME)

ASME B1.20.1	(1983; R 2001) Pipe Threads, General Purpose, Inch
ASME B16.11	(2002) Forged Fittings, Socket-Welding and Threaded
ASME B16.34	(1996) Valves Flanged, Threaded, and Welding End
ASME B16.39	(1998) Malleable Iron Threaded Pipe Unions
ASME B31.1	(2001) Power Piping
ASME B40.1	(1991) Gauges - Pressure Indicating Dial Type - Elastic Element
ASME BPVC SEC IX	(2001) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications
ASME BPVC SEC VIII D1	(2001) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage

ASTM INTERNATIONAL (ASTM)

ASTM A 106	(2002a) Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A 182/A 182M	(2002) Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A 53/A 53M	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM B 127	(1998) Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip
ASTM B 164	(2003) Nickel-Copper Alloy Rod, Bar, and Wire

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2002) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(2002) Pipe Hangers and Supports - Selection and Application
MSS SP-71	(1997) Gray Iron Swing Check Valves, Flanged and Threaded Ends
MSS SP-80	(2003) Bronze Gate, Globe, Angle and Check Valves
MSS SP-84	(1990) Valves - Socket Welding and Threaded Ends
MSS SP-89	(1998) Pipe Hangers and Supports - Fabrication and Installation Practices

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000) Industrial Controls and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures
NEMA MG 1	(1998) Motors and Generators

NATIONAL FLUID POWER ASSOCIATION (NFLPA)

NFLPA T3.12.3 R2	(1992) Pressure Regulator - Industrial Type

PIPE FABRICATION INSTITUTE (PFI)

PFI ES 22	(2002) Color Coding of Piping Materials

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 10	(2000) Near-White Blast Cleaning

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-C-15726	(Rev. F; Am. 1) Copper-Nickel Alloy, Sheet, Plate, Strip, Bar, Rod, and Wire
MIL-T-27730	(Rev. A; Notice 2) Tape, Antiseize, Tetrafluoroethylene, with Dispenser

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-1689	(Rev. B) Tape, Pressure-Sensitive Adhesive, (Plastic Film)
FS A-A-60001	(Basic) Traps, Steam
FS WW-S-2739	(Basic) Strainers, Sediment: Pipeline, Water, Air, Gas, Oil, or Steam

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.219	Mechanical Power Transmission Apparatus

1.2 RELATED REQUIREMENTS

Section 15050N BASIC MECHANICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Air compressor

Instrumentation and controls

Air receivers

Piping and tubing

Fittings

Valves

Adapters

Pressure gages

Traps

Filters

Strainers

Unions

O-ring gaskets

Flexible connections

Hangers and supports

Identification labels for piping

For receivers include Manufacturer's Data Report Form U-1 or U-1A.

SD-06 Test Reports

Leak tightness test

SD-07 Certificates

Employer's record documents

Welding procedures and qualifications

SD-08 Manufacturer's Instructions

Air receivers

Include recommended certification test procedure and procedure for cleaning, external painting, and delivery preparation.

SD-10 Operation and Maintenance Data

Air compressor, Data Package 4

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Posted operating instructions for air compressor

Posted operating instructions for compressed air systems

1.4 QUALITY ASSURANCE

Provide all work specified in this section, including design, materials, fabrication, assembly, erection, installation, and examination, inspection and testing of compressed air systems in conformance with ASME B31.1, ASME BPVC SEC VIII D1 and ASME BPVC SEC IX, as modified and supplemented by this specification section and accompanying drawings. In ASME B31.1, ASME BPVC SEC VIII D1 and ASME BPVC SEC IX, the advisory provisions shall be considered mandatory, as though the word "shall" had been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" and "owner" shall be interpreted to mean the Contracting Officer.

1.4.1 Equipment Data

Submit the following data for equipment listed for "Operation and Maintenance Instructions, Parts and Testing."

a. Name and address of authorized branch or service department.

b. Characteristic curves.

c. Following applicable data completely filled in:

Manufacturer and model number _____

Operating speed _____

Capacity _____ (CFM)

Type of bearings in unit _____

Type of lubrication _____

Type and adjustment of drive _____

Capacity of tank _____

Electric motor: Manufacturer, frame and type _____

Motor speed _____ RPM

Current characteristics and HP of motor _____

_____ Thermal cut-out switch: Manufacturer, type and model _____

Starter: Manufacturer: Type and model _____

1.4.2 Welding Requirements

Provide all welding work specified in this section for compressed air piping systems and in conformance with ASME B31.1, as modified and supplemented by this specification section and the accompanying drawings. The welding work includes: qualification of welding procedures, brazing procedures, welders, brazers, welding operators, brazing operators, inspection personnel, nondestructive examination personnel, maintenance of welding records, and examination methods for welds.

1.4.2.1 Butt Welded Joints

Butt welded joints shall be full penetration joints. Butt welded joints in systems with working pressures over 300 psig shall be full penetration welds with consumable inserts or backing rings.

1.4.3 Employer's Record Documents

Submit to the ROICC for his review and approval the following documentation. This documentation and the subject qualifications shall be in compliance with ASME B31.1.

a. List of qualified welding procedures that is proposed to be used to provide the work specified in this specification section.

b. List of qualified welders, brazers, welding operators, and brazing operators that are proposed to be used to provide the work specified in this specification section.

c. List of qualified weld inspection personnel that are proposed to be used to provide the work specified in this specification section.

1.4.4 Welding Procedures and Qualifications

Determine performance qualification in accordance with ASME B31.1 and as specified.

1.4.4.1 Specifications and Test Results

Submit copies of the welding procedure specifications and procedure qualification test results for each type of welding required. Approval of any procedure does not relieve the Contractor of the responsibility for producing acceptable welds. Submit this information on the forms printed in ASME BPVC SEC IX or their equivalent.

1.4.4.2 Certification

Before assigning welders or welding operators to the work, submit a list of qualified welders, together with data and certification that each individual is performance qualified as specified. Do not start welding work prior to submitting welder, and welding operator qualifications. The certification shall state the type of welding and positions for which each is qualified, the code and procedure under which each is qualified, date qualified, and the firm and individual certifying the qualification tests.

1.4.4.3 Renewal of Qualification

Requalification of a brazer or brazing operator shall be required under any of the following conditions:

a. When a brazer or brazing operator has not used the specific brazing process for a period of 6 months.

b. There is specific reason to question his ability to make brazes that will meet the requirements of the specifications.

1.4.5 Experience for Installation and Testing

Experience for Installation and Testing Of Medium Pressure Air System: Install and test medium pressure air piping and equipment in accordance with ASME B31.1 and only with competent personnel specially trained and experienced in installation and testing of medium pressure air systems. The supervisors and personnel performing installation and testing shall have had previous experience in the satisfactory installation and testing of at least two medium pressure air systems. Submit data substantiating this experience to the Contracting Officer for approval prior to performing any work. Supervisors and personnel with experience not acceptable to the Contracting Officer will be prohibited from working on these systems. Experience data shall include the following.

a. Name of employee

b. Employer

c. List educational background and specialized training on installation and testing medium pressure systems, including safety precautions.

d. List at least two installations of each type of system worked on and installed and tested satisfactorily.

(1) Type of system and operating or design pressure; for medium pressure 126 to 399 psig.

(2) Company or owner.

(3) Location.

(4) Name, address, and phone number of a person who can be contacted for verification at the installation.

e. If registered engineer, give the state in which registration is held, and branch of engineering. An engineer is required to supervise safety during testing of medium and high pressure air systems.

1.4.6 Qualification of Pressure Vessel (Receiver) Inspectors

State Certification of Competency and active commission from the National Board of Boiler and Pressure Vessel Inspectors (NBBI), Columbus, Ohio.

1.4.7 Training

Where special cleaning, flushing, material control, testing, and other special requirements are used on a contract, such as required for high pressure compressed air systems, conduct formal training programs for employees on the special requirements. Maintain records on such training which shall be available for inspection by the Contracting Officer. Certify that employees have satisfactorily completed the required training prior to performing work on the contract.

1.5 SAFETY PRECAUTIONS

1.5.1 Temperature Restriction

Compressors or other equipment shall not discharge compressed air to the piping systems above 100 degrees F unless approved by the Contracting Officer. Aftercoolers or other devices shall be provided to comply with the temperature restriction.

1.5.2 Rotating Equipment

Fully guard couplings, motor shafts, gears and other exposed rotating or rapidly moving parts in accordance with OSHA 29 CFR 1910.219. Provide rigid and suitably secured guard parts readily removable without disassembling guarded unit.

1.5.3 Welding and Brazing

Safety in welding, cutting, and brazing of pipe shall conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 MEDIUM PRESSURE AIR COMPRESSOR

126 to 399 psig system. Two-stage, air cooled reciprocating, belt driven type, suitable for supplying compressed air at pressures indicated. Provide compressor with ball or roller type bearing, pressure lubricated, thermal overload protection as required by NEMA, pressure switch, inlet

filter-mufflers, vibration isolators, intercoolers, aftercooler, and flexible connectors. Provide safety control for shutdown and alarm on high discharge air temperature or low oil pressure. Capacity and operating pressure as indicated on drawings. Mount compressor and motor on a base plate and set on the receiver. Design receiver for additional load of compressor and motor.

2.1.1 Receiver

Build receiver (tank) of welded steel, in accordance with ASME BPVC SEC VIII D1, Unfired Pressure Vessels, for 399 psig working pressure at 450 degrees F, complete with pressure gage, ASME BPVC SEC VIII D1 and ASME BPVC SEC IX code stamped safety valve, check valve, shut-off valve on tank outlet, and automatic tank drain on tank. Provide tank with steel supports and bolt to a concrete foundation. Capacity as indicated.

2.1.2 Motor and Starter

Provide motor and starter 72 degrees F ambient temperature rise, continuous duty, drip-proof type motor, ball bearings, for operation with current of voltage, phase, and cycle indicated on the electrical drawings. Motor of such capacity that brake horsepower required by driven equipment at normal rated capacity will not exceed nameplate rating of motor. Provide each motor with automatic, fully enclosed, magnetic starter. Conform to NEMA MG 1 for motor and NEMA ICS 2and NEMA ICS 6 for starter and controls.

2.1.3 Controls

Provide start-and-stop control. Motor shall stop automatically when discharge pressure reaches maximum pressure setting and start automatically when discharge pressure falls to minimum setting. Cylinders shall unload automatically during periods of motor shutdown.

2.1.4 Intercoolers and Aftercoolers

Provide intercoolers between all intermediate stages of multi-stage compressors and provide aftercoolers with compressors. Intercoolers for air-cooled compressors shall be the tube-and-fin type. Air cooled intercoolers may be the integral cast type when compressor is 25 hp or less. Aftercoolers shall be of the air-cooled tube-and-fin type. Air-cooled intercoolers and aftercoolers shall have sufficient capacity to cool the compressed air to within 20 degrees F of the ambient temperature under the atmospheric conditions indicated. The pressure drop of compressed air through the cooler shall not exceed one psi. Provide intercoolers and aftercoolers with a moisture separator and drain trap to remove the condensed moisture and oil from the air leaving the cooler.

2.1.4.1 Tube-and-Fin

Copper, aluminum, copper-aluminum, or copper-alloy construction. Fins shall be securely bonded to the tubing. Provide tube-and-fin coolers with a fan for circulation of the cooling air. The fan shall be adequately guarded for safety and be driven either from the compressor crankshaft or by an independent electric motor.

2.1.5 Noise

84 dBA maximum sound level one meter from compressor unit.

2.2 MEDIUM PRESSURE Air receivers

ASME BPVC SEC VIII D1, labeled and rated for 275 psig, equipped with required valves and trimmings, including gage and automatic drain valve and ASME BPVC SEC VIII D1 and ASME BPVC SEC IX pressure safety relief valve. Pressure as indicated. Sandblast exterior and interior to SSPC SP 10, near-white. Lining shall be a factory applied 8 mil minimum epoxy coating. Exterior finish shall be two coats of rust inhibitor primer and one coat epoxy enamel.

2.3 MEDIUM PRESSURE COMPRESSED AIR PIPING AND ACCESSORIES

Medium pressure compressed air piping and accessories 126 to 399 psig at 150 degrees F shall conform to the following:

2.3.1 Pipe

ASTM A 53/A 53M or ASTM A 106, seamless carbon steel, Schedule 40, galvanized.

2.3.2 Fittings, Size 1 1/2 Inches and Smaller

ASME B16.11, forged carbon steel, Class 3000 socket welding or Class 2000 threaded. Seal weld threaded joints not required to disassemble piping for maintenance. Joints may also be butt welded or flanged.

2.3.3 Flat-faced Steel Flanges

Where connections are made to Class 250 cast iron flanges with steel flanges, use only flat-faced Class 300 steel flanges.

2.3.4 Unions

ASME B16.39, Class 2 (500 psig WOG, cold, non-shock).

2.3.5 Valves

2.3.5.1 Globe and Angle Valves

Sizes 2 inches and smaller, bronze, MSS SP-80, Type 3 (Metallic Disc, Renewable Seat), Class 300, threaded ends, or carbon steel, MSS SP-84, Class 300, threaded ends. Sizes larger than 2 inches, ASME B16.34, carbon steel, tapered disk, Class 300, flanged ends.

2.3.5.2 Check Valves

ASME B16.34 or MSS SP-71, Class 300, steel, lift or swing type.

2.3.5.3 Pressure Reducing Valves

NFLPA T3.12.3 R2, with nominal pressure rating of not less than inlet system pressure indicated. Provide pressure reducing valves capable of being adjusted to specified flow and pressure, and suitable for intended service. Provide pilot valve for dome loaded type if required for proper operation.

2.3.5.4 Safety Valves

ASME BPVC SEC VIII D1 and ASME BPVC SEC IX, Code stamped safety valve,

bronze body with bronze trim, for unfired pressure vessels, threaded or flanged connection; factory set and sealed.

2.3.6 Pressure Gages

ASME B40.1, Accuracy Grade A, for air, with steel or brass case, and nonshatterable safety glass, and a pressure blowout back to prevent glass from flying out in case of an explosion. Gages shall have a 3 1/2 inch minimum diameter dial and a dial range of approximately twice working pressure.

2.3.7 Pipe Hangers and Supports

MSS SP-58, MSS SP-69, and ASME B31.1, except as specified or indicated otherwise. Provide zinc plated pipe hangers and supports. Provide tubing supports of U-shaped steel bolts and nuts firmly secured to adequately support structures such as walls, columns, floors, or brackets. Clips shall fit closely around piping but shall have sufficient clearance to permit longitudinal movement of piping during normal expansion and contraction. Provide supports at valves, fittings, branch lines, outlets, changes in direction, equipment, and accessories.

2.3.8 Strainers

FS WW-S-2739, Class 250, Style Y, simplex type, with 20-mesh Monel or stainless steel screen.

2.3.9 Traps

FS A-A-60001, to drain water and other liquids from system. Type of traps, as indicated, and rated working pressure not less than system operating pressure.

2.3.10 Flexible Connections

Vibration isolation, wire braid reinforced corrugated metal hose type, line-sized, with bronze end connections, suitable for pressure indicated. Length as recommended by manufacturer but not less than 18 inches.

2.3.11 Tetrafluoroethylene Tape

MIL-T-27730 for screw-jointed pipe.

2.4 SLEEVES

2.4.1 Floor Slabs

Galvanized-steel pipe having an inside diameter at least 1/2 inch larger than the outside diameter of the pipe passing through it. Provide sufficient sleeve length to extend completely through floors, roofs, and walls, so that sleeve ends are flush with finished surfaces except that ends of sleeves for floor slabs shall extend 1/2 inch above finished floor surface. Sleeves located in waterproofed construction shall include flange and clamping ring.

2.4.2 Partitions

Galvanized sheet steel, 26 gage or heavier, of sufficient length to completely extend through partition thickness with sleeve ends flush with

partition finished surface.

2.5 IDENTIFICATION LABELS FOR PIPING

Labels for pipes 3/4 inch O.D. and larger shall bear printed legends to identify contents of pipes and arrows to show direction of flow. Except that of pipes smaller than 3/4 inch O.D., labels shall have color coded backgrounds to signify levels of hazard in accordance with PFI ES 22. Legends and type and size or characters shall also conform to PFI ES 22. Labels shall be made of plastic sheet in conformance with FS A-A-1689 with pressure-sensitive adhesive suitable for the intended applications or they may be premolded of plastic to fit over specific pipe outside diameters 3/4 inch and larger. For pipes smaller than 3/4 inch O.D., furnish brass identification tags 1 1/2 inches in diameter with legends in depressed black-filled characters.

2.6 FRESH WATER

Fresh water for cleaning, flushing, and testing shall be clean and potable.

2.7 BASIC PIPING AND COMPONENT MATERIALS

Conform to the following where material is specified by generic type and no specification is listed.

2.7.1 Stainless Steel

Austenitic type, annealed, ASTM A 182/A 182M.

2.7.2 Nickel-Copper

70-30 nickel-copper, annealed, ASTM B 164, alloy N04400, ASTM B 127.

2.7.3 Copper-Nickel

70-30 copper-nickel, soft temper, MIL-C-15726.

2.7.4 Other Materials

For materials where no specification is listed above, conform to material specifications listed in ASME B31.1 or ASME BPVC SEC VIII D1.

2.8 SOURCE QUALITY CONTROL

Test air compressors and compressed air dryers at the factory to assure proper operation. Certify satisfactory accomplishment of tests.

PART 3 EXECUTION

3.1 INSTALLATION

Install materials and equipment as indicated and in accordance with manufacturer's recommendations.

3.1.1 Piping

Provide Non-Destructive Examination (NDE) report for welding of piping. Unless specifically stated to the contrary, fabrication, assembly, welding, and brazing shall conform to ASME B31.1 for all piping of the air system.

Piping shall follow the general arrangement shown. Cut piping accurately to measurements established for the work. Work piping into place without springing or forcing, except where cold-springing is specified. Piping and equipment within buildings shall be entirely out of the way of lighting fixtures and doors, windows, and other openings. Locate overhead piping in buildings in the most inconspicuous positions. Do not bury or conceal piping until it has been inspected, tested, and approved. Where pipe passes through building structure, pipe joints shall not be concealed, but shall be located where they may be readily inspected and building structure shall not be weakened. Avoid interference with other piping, conduit, or equipment. Except where specifically shown otherwise, vertical piping shall run plumb and straight and parallel to walls. Piping connected to equipment shall be installed to provide flexibility for vibration. Adequately support and anchor piping so that strain from weight of piping is not imposed on the equipment.

3.1.1.1 Fittings

Use long radius ells where appropriate to reduce pressure drops. Mitering of pipe to form elbows, notching straight runs to form full sized tees, or any similar construction shall not be used. Make branch connections with welding tees, except factory made forged welding branch outlets or nozzles having integral reinforcements conforming to ASME B31.1 may be used.

3.1.1.2 Clearances for Welding

Provide clearances from walls, ceilings, and floors to permit the installation of joints. The clearances shall be at least 6 inches for pipe sizes 4 inches and less, 10 inches for pipe sizes over 4 inches, and sufficient in corners. However, the specified clearances shall not waive requirements for welders to be qualified for the positions to be welded.

3.1.1.3 Cleaning

Before jointing and erection of piping or tubing, thoroughly clean interiors of pipe sections, tube, and components. In steel pipe, loosen scale and other foreign matter by rapping sharply and expel by wire brush and swab. Blow out both steel pipe and copper tube and components with compressed air at 100 psig or more. Maintain cleanliness by closure of pipe/tube openings with caps or plugs. Before making final terminal connections, blow out complete system with compressed air at 100 psig or more.

3.1.1.4 Changes in Pipe Size

Use reducing fittings for changes in pipe size. The use of bushings will not be permitted. In horizontal lines, 2 1/2 inches and larger, reducing fittings shall be of the eccentric type to maintain the bottom of the lines in the same plane.

3.1.1.5 Drainage and Flexibility

Compressed air piping shall be free of unnecessary pockets and pitched approximately 3 inches per 100 feet in the direction of flow to low points. Where pipes must be sloped so that condensate flows in opposite direction to air flow, slope 6 inches per 100 feet or greater. Provide flexibility by use of fittings, loops, and offsets in piping. Install branches at top of a main to prevent carryover of condensate and foreign matter.

3.1.2 Threaded Joints

Where possible use pipe with factory cut threads, otherwise cut pipe ends square, remove fins and burrs, and cut taper pipe threads in accordance with ASME B1.20.1. Threads shall be smooth, clean, and full cut. Apply thread tape to male threads only. Work piping into place without springing or springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than three threads remain exposed.

3.1.3 Welding and Brazing

Perform welding and brazing in accordance with qualified procedures using qualified welders and welding operators and brazers. Do not perform welding and brazing when the quality of the completed weld or braze could be impaired by the prevailing working or weather conditions. The Contracting Officer will determine when weather or working conditions are unsuitable for welding. Welding of hangers, supports, and plates to structural members shall be in accordance with AWS D1.1/D1.1M. Mark welding and brazing detail drawings to identify the welder or brazer making the joint.

3.1.3.1 Cleaning for Welding and Brazing

Surfaces to be welded or brazed shall be free from loose scale, slag, rust, paint, oil, and other foreign material. Joint surfaces shall be smooth and free from defects which might affect proper welding. Clean each layer of weld metal thoroughly by wire brushing, grinding, or chipping prior to inspection or deposition of additional weld metal.

3.1.3.2 Stress Cracking During Brazing

For austenitic stainless steel and other material susceptible to stress corrosion cracking from molten brazing filler metal, avoid applying stress during brazing.

3.1.3.3 Welding or Brazing of Valves

Welding or Brazing of Valves: Disassemble valves subject to damage from heat during welding or brazing and reassemble after installation. Open valves two or three turns off the seat when not subject to heat damage during welding or brazing; do not backseat valve.

3.1.4 Valves

Install valves in conformance with ASME B31.1 at the locations indicated and elsewhere as required for the proper functioning of the system.

3.1.4.1 Globe Valves

Install globe valves so that the pressure will be below the disk. Install globe valves with the stems vertical.

3.1.4.2 Pressure-Reducing Valves

Provide compressed air entering each pressure-reducing valve with a strainer. Provide each pressure-reducing valve unit with two block valves and with a globe or angle bypass valve and bypass pipe. Provide a bypass around a reducing valve of reduced size to restrict its capacity to

approximately that of the reducing valve. Provide each pressure reducing valve unit with an indicating gage to show the reduced pressure, and a safety valve on the lower pressure side. These requirements do not apply to small pressure regulating valves used to adjust pressure for pneumatic equipment.

3.1.5 Hangers and Supports

Selection, fabrication and installation of piping hangers and supports shall conform to MSS SP-58, MSS SP-69, and MSS SP-89 except that spacing of the hangers and supports shall be as per Table I.

TABLE I. MAXIMUM SPAN FOR PIPE

DIAMETER INCHES	STD. WT. STEEL PIPE SCHEDULE 40	EX. STRONG STEEL PIPE SCHEDULE 80
1/2	5'-0"	5'-0"
3/4	5'-9"	5'-9"
1	6'-6"	6'-6"
1 1/2	7'-6"	7'-9"

3.1.6 Pressure Gages

Provide pressure guages with a shut-off valve or petcock installed between the gage and the line.

3.1.7 Strainers

Provide strainers with meshes suitable for the services where indicated, or where dirt might interfere with the proper operation of valve parts, orifices, or moving parts of equipment.

3.1.8 Equipment Foundations

Provide equipment foundations of sufficient size and weight and of proper design to preclude shifting of equipment under operating conditions or under any abnormal conditions which could be imposed upon the equipment. Provide foundations which meet the requirements of the equipment manufacturer, and when required by the Contracting Officer, obtain from the equipment manufacturer approval of the foundation design and construction for the equipment involved. Equipment vibration shall be maintained within acceptable limits, and shall be suitably dampened and isolated.

3.1.9 Equipment Installation

Install equipment strictly in accordance with these specifications, and the manufacturers' installation instructions. Grout equipment mounted on concrete foundations before piping is installed. Install piping in a manner that does not place a strain on any of the equipment. Do not bolt flanged joints tight unless they match properly. Extend expansion bends adequately before installation. Grade, anchor, guide and support piping without low pockets.

3.1.10 Cleaning of System

Clean the various system components before final closing as the installations are completed. Remove foreign matter from equipment and surrounding areas. Preliminary or final tests will not be permitted until the cleaning is approved by the Contracting Officer.

3.1.11 Pipe Sleeves

Provide pipe sleeves where pipes and tubing pass through concrete floors and partitions. Hold sleeves securely in proper position and location before and during construction. All sleeves shall be of sufficient length to pass through entire thickness of walls, partitions, or slabs. Extend sleeves in floor slabs 2 inches above the finished floor. Pack space between the pipe or tubing and the sleeve firmly with oakum and caulk both ends of the sleeve with elastic cement.

3.1.12 Floor, Wall, and Ceiling Plates

Provide chromium-plated steel or nickel-plated cast iron plates on pipes passing through floors and partitions of finished rooms. Provide painted cast-iron, malleable iron, or steel for other areas.

3.1.13 Flashing for Buildings

Provide flashing as required where pipes pass through building roofs and outside walls.

3.1.14 Unions and Flanges

Provide unions and flanges where necessary to permit easy disconnection of piping and apparatus, and as indicated. Provide a union for each connection having a screwed-end valve. Provide unions on piping under 2 inches in diameter, and provide flanges on piping 2 inches and over in diameter. Install dielectric unions or flanges between ferrous and non-ferrous piping, equipment, and fittings; except that bronze valves and fittings may be used without dielectric couplings for ferrous-to-ferrous or non-ferrous to non-ferrous connections.

3.1.15 Painting of Piping and Equipment

Paint piping and equipment in accordance with Section 09900 PAINTS AND COATINGS.

3.1.16 Identification of Piping

Identify piping in accordance with PFI ES 22. Use commercially manufactured piping identification labels. Space identification marking on runs not farther apart than 50 feet. Provide two copies of the piping identification code framed under glass and install where directed.

3.2 CLEANING SILVERBRAZED PIPING

Clean silverbrazed piping to remove residual flux remaining in the system after fabrication. Use one of the procedures below. The hot flush and hot recirculating flush are preferred. Minimum flow rate through any part of the system in gallons per minute shall be 1.5 times the inside diameter of the pipe in inches. For any flushing method used, the system shall be full

of water so that joints are completely submerged at all times.

3.2.1 Hot Flushing Method

Hot flush the system for one hour using heated fresh water. No part of the system shall go below 110 degrees F.

3.2.2 Hot Recirculating Flush Method

Perform hot recirculating flush for one hour. Heat water during flushing so that no part of the system falls below 110 degrees F. After completing the hot recirculating flush, flush the system with cold fresh water for 15 minutes.

3.2.3 Cold Soak Method

Cold soak the system using fresh water at not less than 60 degrees F for 12 hours. Following the 12 hour soak, flush the system with fresh water at not less than 60 degrees F for 4 hours.

3.3 FIELD QUALITY CONTROL

3.3.1 Testing

3.3.1.1 General Requirements, Testing

Perform testing after cleaning and acceptance of cleanness. Contractor shall provide everything required for tests. Tests shall be subject to the approval of the Contracting Officer. Calibrate the test pressure gage with a dead weight tester within 15 days before use and certify by initial and date on a sticker applied to dial face.

a. Supervision of Testing

For medium pressure system, an experienced registered professional engineer responsible for safety and employed by the Contractor shall be present during testing.

3.3.1.2 Hydrostatic and Leak Tightness Tests

a. Preliminary Preparation

Remove or isolate from the system the compressor, filters, instruments, and equipment which would be damaged by water during hydrostatic tests and reinstall after successful completion of tests.

b. Performance of Hydrostatic Tests

Hydrostatically test piping systems in accordance with ASME B31.1. Vent or flush air from the piping system. Pressurize system for 10 minutes with water at one and one-half times design working pressure, then reduce to design working pressure and check for leaks and weeps.

c. Compressed Air Leak Tightness Test

After satisfactory completion of hydrostatic pressure test, blow systems dry with clean, oil-free compressed air, and test with clean, dry air at design working pressure. Brush joints with soapy water solution to check for leaks. Install a calibrated test pressure gage in piping system to

observe any loss in pressure. Maintain required test pressure for a sufficient length of time to enable an inspection of joints and connections.

3.3.1.3 Operational Tests

Test equipment as in service to determine compliance with contract requirements and warranty. During the tests, test equipment under every condition of operation. Test safety controls to demonstrate performance of their required function. Completely test system for compliance with specifications.

3.4 INSTRUCTION TO GOVERNMENT PERSONNEL

Provide .5 man-days of instruction to 2 Government personnel in accordance with Section 15050N BASIC MECHANICAL MATERIALS AND METHODS for each type of compressor and compressed air dryer in the project.

-- End of Section --

SECTION 15400N

PLUMBING SYSTEMS
11/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A112.36.2M	(1991; R 2002) Cleanouts
ANSI B16.18	(1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings
ANSI B16.23	(1992; Errata 1994) Cast Copper Alloy Solder Joint Drainage Fittings - DWV
ANSI Z21.22	(1999; A 2001) Relief Valves for Hot Water Supply Systems

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1	(2001; various Errata) Energy Standard for Buildings Except Low-Rise Residential Buildings

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1019	(1997) Vacuum Breaker Wall Hydrants, Freeze Resistant, Automatic Draining Type

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C105	(1999) Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C651	(1999) Disinfecting Water Mains

ASME INTERNATIONAL (ASME)

ASME A112.21.1M	(1991; R 1998) Floor Drains
ASME B16.1	(1998) Cast Iron Pipe Flanges and Flanged Fittings
ASME B16.22	(2002) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes

ASME B16.29	(2002) Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASME B16.3	(1998) Malleable Iron Threaded Fittings
ASME B16.32	(1992) Cast Copper Alloy Joint Fittings for Solvent Drainage Systems
ASME BPVC SEC IV	(2001) Boiler and Pressure Vessel Code; Section IV, Recommended Rules for the Care and Operation of Heating Boilers

ASTM INTERNATIONAL (ASTM)

ASTM A 53	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B 306	(2002) Copper Drainage Tube (DWV)
ASTM B 32	(2003) Solder Metal
ASTM B 42	(2002) Seamless Copper Pipe, Standard Sizes
ASTM B 88	(2002) Seamless Copper Water Tube
ASTM D 2665	(2002ae1) Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D 1785	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D 2464	(1999) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2467	(2001) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM F 441/F 441M	(1999e1) Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies

INTERNATIONAL CODE COUNCIL (ICC)

ICC IPC	(2003)International Plumbing Code

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2002) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(2002) Pipe Hangers and Supports - Selection and Application

MSS SP-80	(2003) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 211	(2003) Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
NFPA 54	(2002) National Fuel Gas Code

PLUMBING AND DRAINAGE INSTITUTE (PDI)

PDI WH 201	(1992) Water Hammer Arresters

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-R-6855	(Rev. E; Notice2; Supp. 1) Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes

UNDERWRITERS LABORATORIES (U.L.)

UL 1453	(1995 Rev. thru Sep 1998) Electric Booster and Commercial Storage Tank Water Heaters

1.2 RELATED REQUIREMENTS

Section 15050N BASIC MECHANICAL MATERIALS AND METHODS, applies to this section with the additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

Provide new plumbing systems, complete and ready for operation. Plumbing systems including manufacturer's products shall be in accordance with the required and advisory provisions of the ICC IPC. Plumbing systems include piping less than 5 feet outside of building walls.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Pipe and fittings

Valves

Water heaters

Pipe hangers and supports

Pressure gages

Strainers

Drains

Water hammer arresters

Backflow preventers

Thermometers

SD-06 Test Reports

Backflow Preventers Test Report

SD-10 Operation and Maintenance Data

Water heaters, Data Package 2

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.5 QUALITY ASSURANCE

Plumbing systems including fixtures, equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears; reference to the "authority having jurisdiction," the Administrative Authority, the Plumbing Official, and the Design Engineer shall be interpreted to mean the Contracting Officer. Capacity of equipment shall be not less than that indicated.

PART 2 PRODUCTS

2.1 DRAIN, WASTE, AND VENT (DWV) PIPE AND FITTINGS

Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 2 inches for buried piping and 1.5 inches for aboveground piping.

2.1.1 Buried Piping

Provide piping up to but not more than 6 inches aboveground or floor slab on grade.

2.1.1.1 Plastic Pipe, Fittings, and Solvent Cement

a. Polyvinyl Chloride (PVC) System: ASTM D 2665.

2.1.2 Aboveground Piping

2.1.2.1 Plastic Pipe, Fittings, and Solvent Cement

a. Polyvinyl Chloride (PVC) System: ASTM D 2665.

2.1.2.2 Copper Tubing

ASTM B 306, with ANSI B16.23, ASME B16.29, or ASME B16.32 solder joint fittings using ASTM B 32, 95-5 tin-antimony or Grade Sn96 tin-silver solder, and flux containing not more than 0.2 percent lead.

2.1.3 Cleanouts

ANSI A112.36.2M; provide threaded bronze or thermoplastic or PVC plastic cleanout plugs.

2.1.3.1 Floor Cleanouts

Provide cast-iron or ductile-iron floor cleanout with flange, adjustable height polished bronze, nickel bronze, stainless steel, or chromium-plated copper alloy rim and scoriated floor plate with "CO" cast in the plate, and countersunk screws for installing floor plate flush with finished floor.

2.1.3.2 Wall Cleanouts

Provide polished stainless steel or chromium-plated copper alloy cover plate and secure to cleanout plug with countersunk stainless steel screw.

2.1.3.3 Cleanouts Exterior to Buildings

Provide cast-iron or polyvinyl chloride (PVC) cleanouts and countersunk plugs. Provide 24 by 24 by 4 inch thick concrete slab with top one inch above grade with cleanout located in center of slab. Provide cast-iron cleanout box with cover.

2.1.4 Drains

ASME A112.21.1M; provide cast-iron or ductile-iron drains and clamping rings for use with membrane waterproofing. Provide P-traps for each floor drain.

2.1.4.1 Flush Strainer Floor Drains

Provide with double drainage flange, perforated or slotted cast bronze or nickel bronze, polished stainless steel, or chromium-plated copper alloy strainer, and adjustable collar. Drains of sizes 2, 3, and 4 inches shall have strainers with minimum free drainage area of 5, 11, and 18 square inches, respectively.

2.2 DOMESTIC WATER PIPING

2.2.1 Buried Piping and Aboveground Piping

2.2.1.1 Copper Tubing

ASTM B 88, Type L or M for aboveground piping, Type K for buried piping, with ANSI B16.18 or ASME B16.22 solder joint fittings; or with ASME B16.26 flared joint fittings. Provide ASTM B 42 copper pipe nipples with threaded end connections. Provide ASTM B 32, 95-5 tin-antimony solder, or provide Plumbing Code approved lead-free solder. Provide copper tubing for pipe sizes 4 inches or smaller.

2.2.2 Process Water Piping

a. Final Rinse Water (FRW), Reclaim Water (RW), Wash Water with Soap (WWS) and Soap Piping.

1. PVC, Schedule 80 pipe: ASTM D 1785

2. PVC, Schedule 80 fittings: ASTM D 2467, socket type or ASTM D 2464, threaded type

b. Pressure Washer Pipe (PW) and Spinner Water Supply (SWS) Piping

1. Galvanized Steel, Schedule 80 Pipe: ASTM A 53

2. Galvanized Malleable Iron Threaed Fittings, Schedule 80: ASME B16.3

c. Reverse Osmosis Water (RO)

1. Copper, Type "K" Hard Drain: ASTM B 88

2. Wrought Copper Solder Joint Fittings: ASTM B16.18

2.2.3 Water Valves

Provide valves suitable for minimum of 125 psig and minimum of 180 degrees F hot water. Valves shall have flanged end connections, except sizes smaller than 2.5 inches may have threaded end connections with a union on all but one side of the valve, or solder end connections for connections between bronze valves and copper tubing. Ball valves may be provided in lieu of gate valves. Provide blue finish and red finish on handwheels for valves in cold domestic water piping and hot domestic water piping, respectively.

2.2.3.1 Gate Valves

MSS SP-80, Class 125.

2.2.3.2 Check Valves

MSS SP-80, Class 125, swing check.

2.2.3.3 Ball Valves

Full port design, copper alloy. Valves shall have two-position lever handles.

2.2.3.4 Hose Bibbs

Provide angle type copper alloy hose bibb with lockshield and removable handwheel. Inlet shall have internal threads. Outlet shall have vacuum breaker with 0.75 inch external hose threads.

2.2.3.5 Nonfreeze Wall Hydrant

ASSE 1019, cast bronze, with lockshield and removable handwheel one inch external thread inlet, 0.75 inch external hose thread outlet with automatic draining vacuum breaker. Hydrant shall be of sufficient length to extend through walls and place the valve seat inside the building or in the crawl space. Bonnet and valve stem shall be removable from outside of the building.

2.2.3.6 Combination Pressure and Temperature Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating, test lever, and discharge capacity based on AGA temperature steam rating.

2.2.3.7 Pressure Relief Valves

ANSI Z21.22 copper alloy body, automatic reseating with test lever.

2.2.4 Strainers

Strainers shall have blow off outlet with pipe nipple and gate valve and discharge pipe nipple. Copper alloy or cast-iron body. Provide stainless steel strainer element with perforations of 0.047 inch.

2.2.5 Pressure Gages

Provide single style pressure gage for water with 4.5 inch dial, brass or aluminum case, bronze tube, gage cock, pressure snubber, and siphon. Provide scale range suitable for the intended service.

2.2.6 Thermometers

Provide bi-metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 5 inch diameter dial with glass face gasketed within the case; accuracy within 2 percent of scale range. Provide scale range suitable for the intended service.

2.2.7 Dielectric Connections

Provide at connections between copper and ferrous metal piping materials. ASTM F 441/F 441M, Schedule 80, CPVC threaded pipe nipples, 4 inch minimum length, may be provided for dielectric connections in pipe sizes 2 inches and smaller.

2.2.8 Water Hammer Arresters

PDI WH 201.

2.2.9 Backflow Preventers

Reduced pressure principle assemblies, double check valve assemblies, atmospheric (nonpressure) type vacuum breakers, and pressure type vacuum breakers shall be listed in the current FCCCHR List.

2.3 MISCELLANEOUS PIPING MATERIALS

2.3.1 Flanges

ASME B16.1, Class 125, for use in ferrous piping; ASME B16.22 or ANSI B16.24 for use in copper tubing; with MIL-R-6855 full face flat type synthetic rubber gaskets.

2.3.2 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide chromium-plated or polished stainless steel finish on copper alloy plates in finished spaces. Provide paint finish on metal in unfinished spaces.

2.3.3 Pipe Sleeves

2.3.3.1 Sleeves in Concrete Floors

ASTM A 53, Schedule 40 or Standard Weight, hot-dip galvanized steel pipe sleeves.

2.3.3.2 Sleeves in Non-Masonry or -Concrete Walls, Floors, and Roofs

Provide 26 gage hot-dip galvanized steel sheet.

2.3.3.3 Mechanical Sleeve Seals

Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

a. Sealing ELements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

b. Pressure Plates: Stainless steel. Include two for each sealing element.

c. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3.4 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one inch minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of sleeves or core-drilled holes with UL listed fill, void, or cavity material.

a. Sleeves in masonry and concrete walls, floors, and roofs: Provide steel pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

b. Sleeves in other than masonry and concrete walls, floors, and roofs: Provide 26 gage galvanized steel sheet.

c. Provide mechanical sleeve seals for piping penetrations of Wash Bay Pit walls by drain piping..

2.3.5 Pipe Hangers and Supports

Provide MSS SP-58 and MSS SP-69, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists

with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

2.4 ELECTRIC WATER HEATERS, COMMERCIAL TYPE

ASME BPVC SEC IV and UL 1453 for electric heaters with heat input, recovery, and storage capacity as indicated. Tank shall be rated for a working pressure of 150 psi, ASME stamped, and nickel and glass lined or cement lined. Provide thermometer in thermometer well. Insulate water heater with fiberglass insulation and trim with baked enamel finished steel sheet jacket. Standby heat loss shall conform to ASHRAE 90.1 high efficiency requirements. Water temperature shall be adjustable between 110 and 180 degrees F. Provide ASME temperature and pressure relief valve. Water heater shall bear UL Label Service Listing and National Board of Boiler and Pressure Vessel Inspection (NBBPVI) registration and stamp.

2.4.1 Gas Vents

NFPA 211, Type B, of the prefabricated multi-wall UL listed type.

2.4.2 Gas Piping System

NFPA 54. Provide threaded fittings and end connections.

2.4.3 Gas Valves

Provide cast-iron or bronze body valves, with bronze plug or ball and two position lever handles. Valves shall be suitable for 125 psig working pressure. UL listed ball valves may be provided in lieu of plug valves.

PART 3 EXECUTION

3.1 INSTALLATION

Installation of plumbing systems and process piping systems including backflow preventers, equipment, materials, and workmanship shall be in accordance with the Plumbing Code, except as modified herein. Make final connections to "NMIC" washer equipment.

3.1.1 Threaded Connections

Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread paste, pipe cement and oil, or PTFE powder and oil; apply only on male threads. Provide exposed ferrous pipe threads with one coat of primer applied to a minimum dry film thickness of 1.0 mil.

3.1.2 Solder End Valves

Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.

3.1.3 Pipe Supports (Hangers)

Provide additional supports at the concentrated loads in piping between supports, such as for inline water pumps and flanged valves. Maximum of 5 foot apart at valves and pumps.

3.1.3.1 Piping to Receive Insulation

Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations. Temporary wood spacers shall be of the same thickness as the insulation to be provided under Section 15080N MECHANICAL INSULATION.

3.1.3.2 Maximum Spacing Between Supports

a. Vertical Piping: Support metal piping at not more than 10 foot intervals. Support plastic at not more than 5 foot intervals.

b. Horizontal Piping: Locate supports within one foot of joints at each change of direction and with 18 inches of joints for straight runs. Support plastic piping at 4 foot intervals and support plastic piping at each change of direction. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)

Nominal Pipe Size (inches)	One and under	1.25	1.5	2	2.5	3	3.5	4	5	6
Steel Pipe	7	8	9	10	11	12	13	14	16	17
Copper Tube	6	7	8	8	9	10	11	12	13	14

3.1.4 Encased Buried Piping

Completely encase buried copper water piping and DWV piping with polyethylene tube or sheet in accordance with AWWA C105.

3.1.5 Installation of Pipe Sleeves

Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with mineral wool insulation. Seal at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass. Provide a mechanically adjustable segmented elastomeric seal in Wash Rack Pit wall penetrations. Extend sleeves in floor slabs 3 inches above the finished floor, except sleeves are not required where DWV piping passes through concrete floor slabs located on grade.

3.1.6 Copper Tube Extracted Joint

An extracted mechanical tee joint may be made in copper tube. Make joint with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the

thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, provide dimpled depth stops. Notch the branch tube for proper penetration into fitting to ensure a free flow joint. Braze extracted joints using a copper phosphorus classification brazing filler metal. Soldered joints shall not be permitted.

3.2 NAMEPLATES

Provide laminated plastic nameplates for equipment, gages, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. Corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 by 2.5 inches. Lettering shall be minimum of 0.25 inch high normal block lettering. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information:

a. Manufacturer, type, and model number

b. Contract number and accepted date

c. Capacity or size

d. System in which installed

e. System which it controls

3.3 FIELD QUALITY CONTROL

3.3.1 Inspections

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

3.3.2 Field Testing

Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code, except as modified herein. Correct defects in the work provided by the Contractor, and repeat tests until work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for performing tests.

3.3.2.1 Domestic Water Piping

Before applying insulation, hydrostatically test each piping system at not less than 120 psig with no leakage or reduction in gage pressure for 2 hours.

3.3.2.2 Process Water Piping

Before applying insulation, hydrostatically test each piping system at not less than the system working presure with no leakage or reduction in gage pressure for 2 hours.

3.3.2.3 DWV Piping

Cap ends of each system, fill piping with water to the roof, and allow to stand until a thorough inspection has been made. If the system is tested in sections, each opening shall be plugged and each section tested with not less than a 10 foot head of water. After traps have been filled with water, subject the entire system to a final air pressure test of not more than 1.0 inch of water column and a smoke or peppermint test. Perform the air and smoke test with an approved smoke testing machine which shall show a clear passage of smoke and air throughout the entire system. The entire system shall be proven absolutely tight under such test.

3.3.2.4 Backflow Preventers Test Report

Backflow preventers shall be tested by a locally approved and certified backflow assembly tester. A copy of the test report shall be provided to the Contracting Officer prior to placing the domestic water system into operation, or no later than 5 days after the test.

3.4 DISINFECTION

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million (ppm) of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 ppm, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplied by nonportable water is not required.

-- End of Section --

SECTION 15720N

AIR HANDLING UNITS
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL(AMCA)

AMCA 301	(1990) Methods for Calculating Fan Sound Ratings from Laboratory Test Data

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2003) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 117	(2002) Operating Salt Spray (Fog) Apparatus
ASTM D 1654	(1992; R 2000) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000) Industrial Controls and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures
NEMA MG 1	(1998) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

1.2 RELATED REQUIREMENTS

Section 15050N BASIC MECHANICAL MATERIALS AND METHODS, applies to this section with the additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fans

SD-07 Certificates

Fans

SD-10 Operation and Maintenance Data

Fans

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.4 TESTING FOR CORROSION PROTECTION

Comply with ASTM A 653/A 653M, or protect equipment with a corrosion-inhibiting coating or paint system that has proved capable of satisfactorily withstanding corrosion in accordance with ASTM B 117. Test 125 hours for equipment installed indoors and 500 hours for equipment installed outdoors or subjected to a marine atmosphere. Each specimen shall have a standard scratch as defined in ASTM D 1654.

1.4.1 Corrosion Criteria

Upon completion of exposure, evaluate coating or painting in accordance with ASTM D 1654. Coat or paint shall show no indication of deterioration, loss of adhesion, or indication of rust or corrosion extending further than 1/8 inch on either side of original scratch.

1.4.2 Thickness of Coating

Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.

PART 2 PRODUCTS

2.1 FANS

Total sound power level of the fan shall not exceed 90 dBA when tested per AMCA 300 and rated perAMCA 301; statically and dynamically balanced, with air capacities, brake horsepowers, fan types, fan arrangement, and static pressure as indicated. Fan bearing life shall have a minimum average life of 200,000 hours at design operating conditions. Have thermal overload protection in the operating disconnect switches within the building. Construct housings and impellers of steel, except as specified otherwise. For wiring terminations, provide terminal lugs to match branch circuit conductor quantities, sizes, and materials. Enclose terminal lugs in terminal box sized to NFPA 70.

2.1.1 In-line Centrifugal Fans

Description: In-line, direct-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearing, motor and disconnect switch, mounting brackets and accessories.

Housing: Each fan housing shall be square shaped with the four sides constructed of heavy gage formed steel. One side of the fan housing shall

be hinged and shall support the motor and fan wheel assembly allowing the assembly to swing out for service without dismantling the unit in any way.

Direct-Driven Units: Motor mounted in airstream, factory-wired to disconnect switch located on outside of fan housing.

Accessories: The following accessories are required as indicated:

Flanges: For inlet and outlet duct connections.
Spring-type Vibration Isolators.
Inlet guard.
High-pro polyester coating.

2.2 MOTORS AND MOTOR STARTERS

NEMA MG 1, NEMA ICS 2, and NEMA ICS 6, respectively, with electrical characteristics as indicated. Motors shall be dripproof. Motor starters shall be magnetic-across-the-line type with water-resistant enclosure.

PART 3 EXECUTION

3.1 PREPARATION

Provide storage for equipment and materials at the project site. Parts shall be readily accessible for inspection, repair, and renewal. Protect materials and equipment from weather.

3.2 INSTALLATION

Install air distribution equipment as indicated and in accordance with the manufacturer's instructions. Provide clearance for inspection, repair, replacement, and service. Electrical work shall conform with NFPA 70and Division 16, "Electrical." Provide overload protection in the operating disconnect switches and magnetic starters.

3.2.1 Fans

Install with resilient mountings, flexible electrical leads, and flexible connections between fan inlet and discharge ductwork. Provide safety screen for inlet.

3.2.2 Power Ventilators

Secure fan to structure. Extend duct and connect to wall exhaust louver.

3.3 FIELD QUALITY CONTROL

Schedule and administer specified tests. Provide personnel, instruments, and equipment for such tests. Correct defects and repeat the respective inspection and tests. Give the Contracting Officer ample notice of the dates and times scheduled for tests and trial operations.Conduct inspection and testing in the presence of the Contracting Officer.

3.3.1 Inspection

Prior to initial operation, inspect equipment installation for conformance with drawings and specifications.

3.3.2 Preliminary Tests

For each item of air handling and distribution equipment and its components, perform an operational test for a minimum period of 4 hours.

-- End of Section --

SECTION 15768N

ELECTRIC SPACE HEATING EQUIPMENT
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1025	(1980; R 1990, Bul. 1991) Electric Air Heaters

1.2 GENERAL REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Heater installation drawing

SD-03 Product Data

Electric unit heaters

Thermostat

SD-10 Operation and Maintenance Data

Electric unit heaters, Data Package 5

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 ELECTRIC UNIT HEATERS

UL 1025; wattage, voltage, phase, number of steps, Btu/hr and CFM as indicated. Provide control-circuit terminals and single source of power supply. Heaters 5 Kw and larger shall be 3-phase, with load balanced on

each of the three phases. Limit leaving air temperature to 140 degrees F with entering air of 60 degrees F.

2.1.1 Heating Element

Nickel chromium heating wire element, free from expansion noise and 60 Hz hum. Embed element in magnesium-oxide insulating refractory. Seal element in high-mass steel or corrosion-resisting metallic sheath with fins. Enclose element ends in terminal box. Provide not more than six fins per inch. Limit fin surface temperature 550 degrees F at any point during normal operation.

2.1.2 Controls

Include limit controls for overheat protection of heaters. For remote thermostatic operation, provide contactor rated for 100,000 duty cycles. Provide a control transformer to supply 24-volt thermostat control circuit for each heater.

2.1.3 Wiring

Completely factory-prewired to terminal strips, ready to receive branch circuit and control connections for 140 degrees Fcopper wiring.

2.1.4 Thermostat

Provide tamper resistant space thermostat, adjustable without requiring removal of heater components. Thermostat operating range shall be approximately 50 degrees F to a maximum of 75 degrees F with operating differential of 3 degrees F or less.

2.1.5 Disconnect Means

Provide factory-installed safety disconnect switch in the housing or in an auxiliary matching control section with "off" position marking on the face plate.

2.1.6 Outdoor Sensor

Provide outdoor sensor with sunlight-and-rain protection shield. The sensor shall provide a positive heater shut off when outdoor air temperature is 65 degrees F or higher.

PART 3 EXECUTION

3.1 INSTALLATION

Install in conformance with the approved heater installation drawing, NFPA 70, UL listing, and manufacturer's instructions, with necessary clearances for air circulation, maintenance, inspection, service testing and repair. Connect to electrical supply in accordance with Section 16402N INTERIOR DISTRIBUTION SYSTEM.

3.1.1 Unit Heaters

Mount units plumb, square and level with ceiling and walls.

3.1.2 Remote Thermostat

Mount remote room space thermostats 4 feet 6 inches above finished floor on wall. Connect remote thermostatswith conduit and wiring to heaters as indicated.

3.2 FIELD QUALITY CONTROL

Provide necessary personnel, instruments, and equipment to perform tests. Notify the Contracting Officer 5 working days prior to scheduled testings and locations.

3.2.1 Field Inspection

Prior to initial operation, inspect installed equipment for conformance with drawings and specifications.

3.2.2 Insulation Resistance Tests

Test 600-volt wiring to verify that no short circuits or grounds exist. Tests shall be made using an instrument which applies a voltage of approximately 500 volts and provides a direct reading of resistance in ohms.

3.2.3 Operational Tests

Test equipment circuits and devices to demonstrate proper operation.Test each item of control equipment not less than 5 times.

-- End of Section --

SECTION 15810N

DUCTWORK AND DUCTWORK ACCESSORIES
02/04

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL(AMCA)

AMCA 500-D	(1998) Laboratory Methods of Testing Dampers for Rating
AMCA 501	(1993) Application Manual for Air Louvers

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2003) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A	(2002) Installation of Air Conditioning and Ventilating Systems

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA HVAC Duct Const Stds	(1995; Addenda Nov 1997; 6th Printing 2001) HVAC Duct Construction Standards - Metal and Flexible

1.2 RELATED REQUIREMENTS

Section 15050N BASIC MECHANICAL MATERIALS NAD METHODS, applies to this section with the additions and modifications specified herein.

1.3 PRESSURE CLASSIFICATION

SMACNA HVAC Duct Const Stds, Section 1, and as indicated.

1.4 SYSTEM DESCRIPTION

Provide ductwork systems including ductwork, ductwork hangers and supports, equipment, materials, installation, workmanship, fabrication, assembly, erection, and inspection, shall be in accordance with SMACNA HVAC Duct Const Stds as modified and supplemented by the specifications and drawings.

1.4.1 Design Requirements

1.4.1.1 Duct Span Versus Reinforcement Schedule

Submit maximum duct dimension, board stiffness rating, board thickness, type and spacing of reinforcement, and maximum duct static pressure.

1.4.1.2 Automatic Dampers

Submit certification of damper leakage testing and conformance with AMCA 500-D and specified maximum leakage or pressure drop requirements.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Dampers

Louvers

Metal ducts

SD-06 Test Reports

Automatic dampers

Louvers

1.6 QUALITY ASSURANCE

1.6.1 Modification of References

SMACNA Duct Construction Manuals: The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in these manuals.

PART 2 PRODUCTS

2.1 METAL DUCTS

2.1.1 Steel Ducts

ASTM A 653/A 653M galvanized steel sheet, lock-forming quality; coating designation G90.

2.2 DUCTS OF PRESSURE CLASSES 3 INCH WATER GAGE OR LESS

Except as specified or indicated otherwise, construction, metal gage, hangers and supports, and reinforcements shall conform with SMACNA HVAC Duct Const Stds, except that ducts with pressure classifications below 2 inch water gage that are located outside of the conditioned space shall have a seal class C. Ductwork shall be airtight and shall not vibrate or pulsate when system is in operation. Pressure sensitive tape shall not be used as a primary sealant on ductwork with pressure classifications above

one inch water gage. Air leakage shall be less than 5 percent of the system capacity. Construct ductwork of galvanized steel.

2.2.1 Fittings

Provide transitions, flexible connections, and access doors.

2.3 DUCT SLEEVES AND CLOSURE COLLARS

2.3.1 Closure Collars

Four inches wide minimum, fabricated from minimum 20 gage galvanized steel.

2.4 LOUVERS

2.4.1 Louvers

Fixed type incorporating a drainable head member, extended sill, vertical blades and sloped sill to provide maximum resistance to wind blown rain. Mill finish.

2.4.1.1 Frame

Heavy gage 6063T5 extruded aluminum, 8 inches x 0.08 inch nominal dimensions.

2.4.1.2 Blades

Vertical rain resistant style, 6063T5 extruded aluminum, 0.08 inch nominal wall thickness, spaced at 1 1/2 inches on center.

2.4.1.3 Bird Screens

3/4 inch x 0.051 inch flattened, expanded aluminum in removable frame, mounted on rear of louver.

PART 3 EXECUTION

3.1 INSTALLATION

Except as specified or indicated otherwise, conform to NFPA 90A, SMACNA HVAC Duct Const Stds. Provide mounting and supporting of ductwork and accessories including, but not limited to, structural supports, hangers, vibration isolators, clamps and brackets, and dampers. Provide electrical isolation between dissimilar metals. Electrical isolation may be fluorinated elastomers or sponge-rubber gaskets. Install ductwork accessories as indicated and as recommended by manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service. Louvers in accordance with AMCA 501.

3.1.1 Ductwork

Air distribution systems shall operate with no chatter or vibration.

3.1.1.1 Field Changes to Ductwork

Those required to suit the sizes of factory-fabricated equipment actually furnished, shall be designed to minimize expansion and contraction. Use gradual transitions in field changes as well as modifications to connecting

ducts.

3.1.1.2 Access Doors

Provide for automatic dampers, and other concealed apparatus requiring service and inspection in the duct systems.

3.1.1.3 Closure Collars

Provide for ductwork penetrations in floors, walls, and partitions through which metallic ductwork passes.

a. Closure Collars: Fit collars snugly around ducts or insulation. Grind edges of collar smooth to preclude tearing or puncturing insulation covering or vapor barrier. Provide nails with maximum 6 inch centers on collars.

3.1.2 Duct Hangers and Supports

SMACNA HVAC Duct Const Stds, Section 4. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing member, provide suitable intermediate metal framing.

3.1.2.1 Flexible Connectors

Provide flexible connectors between fans and ducts or casings and where ducts are of dissimilar metals. For rectangular ducts, lock flexible connectors to metal collars.

3.1.3 Cleaning of Ducts

Remove all debris and dirt from ducts and wipe clean. Before installing air outlets, force air through entire system at maximum attainable velocity to remove accumulated dust. Provide temporary air filters to protect ductwork which may be harmed by excessive dirt. For large systems, clean duct with high power vacuum machines.

3.2 FIELD QUALITY CONTROL

Administer and direct tests. Furnish instruments, equipment, connecting devices, and personnel for the tests. Notify Contracting Officer 10 days before inspection or testing is scheduled. Correct defects in work. Repeat tests until work is in compliance.

-- End of Section --

SECTION 15901N

SPACE TEMPERATURE CONTROL SYSTEMS
08/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 90A	(2002) Installation of Air Conditioning and Ventilating Systems

1.2 SUBCONTRACTOR SPECIAL REQUIREMENTS

Perform all work in this section in accordance with the paragraph entitled "Subcontractor Special Requirements" in Section 01310N ADMINISTRATIVE REQUIREMENTS. The paragraph specifies that all contract requirements of this section shall be accomplished directly by a first tier subcontractor. No work required shall be accomplished by a second tier subcontractor.

1.3 SYSTEM DESCRIPTION

Provide new space temperature control systems complete and ready for operation.

1.4 SYSTEM REQUIREMENTS

Provide control systems composed of electric devices. Indicated control system devices of a particular type do not intend a requirement for the device unless the requirement is specifically indicated. Requirements apply to field installed control systems.

1.5 PERFORMANCE REQUIREMENTS

Provide control systems to maintain the required heating and ventilating conditions by performing the functions and sequences of operations indicated. Control systems shall be complete, including all equipment and appurtenances, and ready for operation. Control systems shall be furnished, installed, tested, calibrated, and started up by, or under the supervision of trained technicians certified by the Contractor as qualified and regularly employed in such work. Control system equipment, valves, panels and dampers shall bear the manufacturer's nameplate.

1.6 DESIGN REQUIREMENTS

1.6.1 Control System Diagrams

For each system, indicate HVAC process flow and location of devices relative to flow and to the HVAC control panel, the connections of control devices in control loops, references of control device contacts and device operating coils to line numbers of a ladder diagram and sequencing diagrams showing the operation of valves, dampers, and contacts relative to controller output, and HVAC process variables.

1.6.2 Ladder Diagram

Indicate connections and interlocks to control system devices and other devices such as starters, drives, HVAC control system panels, and HVAC equipment panels. Diagram shall be coordinated by line number and device number with each control system diagram.

1.6.3 Operating Parameters

Indicate operating parameters for devices shown on the control system diagram such as setpoints, ranges, limits, differentials, outside air temperature schedules, contact operating points, and HVAC equipment operating time schedules.

1.6.4 Wiring Diagram

Indicate terminal blocks, wire marker identification, connections to control system devices, external and internal power sources, and connections to external devices, starters, drives, control panels, jumpers, and ground connections.

1.6.5 Sequence of Operation

Sequence of operation for each control system coordinated with device identifiers on control system diagram and ladder diagram.

1.6.6 Arrangement Drawing

Arrangement diagram of each control system panel coordinated with device identifiers on the control system diagram and the ladder diagram.

1.7 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Control system diagrams for each HVAC system; G

Ladder diagram; G

Operating parameters; G

Sequence of operation; G

Arrangement drawing; G

Wiring diagram; G

SD-03 Product Data

Actuators; G

Fire protection devices; G

Thermostats; G

SD-06 Test Reports

Commissioning procedures; G

Calibration adjustment and commissioning reports; G

Site testing procedures identifying each item tested and describing each test.; G

Performance verification test plans and procedures; G

SD-07 Certificates

Certification of completion; G

SD-08 Manufacturer's Instructions

Training course documentation; G

SD-10 Operation and Maintenance Data

Space temperature control system, Data Package 3; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Qualified service organization list; G

1.8 QUALITY ASSURANCE

1.8.1 Standard Products

a. Material and equipment shall be standard products of manufacturers regularly engaged in the manufacturing of such products, using similar materials, design and workmanship. The standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of similarly sized equipment and materials used under similar circumstances.

The 2 years experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory

field operation, for not less than 6000 hours exclusive of the manufacturer's factory tests, can be shown.

b. The equipment items shall be supported by a service organization.

1.8.2 Nameplates and Tags

a. Provide nameplates bearing legends as shown and tags bearing device unique identifiers as shown shall have engraved or stamped characters. Nameplates shall be mechanically attached to HVAC control panel doors.

b. A plastic or metal tag shall be mechanically attached directly to each field-mounted device or attached by a metal chain or wire.

c. Each airflow measurement station shall have a tag showing flow rate range for signal output range, duct size, and device identifier where shown.

1.8.3 Verification of Dimensions

Contractor shall become familiar with details of work, shall verify dimensions in the field, and shall advise Contracting Officer of any discrepancy before performing work.

1.8.4 Modification of References

Accomplish work in accordance with NFPA 70, and NFPA 90A, except as modified herein or indicated otherwise for equipment, materials, installation, examination, inspection, and testing. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had be substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to "authority having jurisdiction" and "owner" to mean the Contracting Officer.

1.8.5 Site Testing Procedures

Indicate test equipment to be used including manufacturers' names and model numbers, date of last calibration, and accuracy of calibration.

1.8.6 Commissioning Procedures

Define procedures specific to each control system including instructions on how to set control parameters and setpoints, proportional, integral and derivative mode constants, contact output settings, positioner range adjustments, and calibration checks of transmitters

1.8.7 Calibration Adjustment and Commissioning Reports

Submit specific to each control system, including settings adjustments and results of calibration checks

1.9.7 Space Temperature Control System

In addition to the requirements specified in the paragraph entitled "SUBMITTALS", meet the following requirements. Submit Operation and Maintenance Manuals for items of equipment listed under paragraph entitled "Product Data." Manual shall contain full hardware support documentation, which shall include but not be limited to the following:

a. General description and specifications

b. Installation and initial checkout procedures

c. Detailed electrical and logical description

d. Troubleshooting procedures, diagrams, and guidelines

e. Alignment and calibration procedures for components

f. Preventive maintenance requirements and a maintenance checklist

g. Detailed schematics and assembly drawings

h. Spare parts list data, including required tool kits and suggested method of repairs such as field repair, factory repair, or item replacement

i. Signal identification and timing diagrams

j. Complete as-built control drawings, schedules, and sequence of operation

k. Controller configuration and parameter setting procedures

l. Step-by-step procedures required for each HVAC control systems startup, operation, shutdown, recovery, and fault diagnosis

m. Manufacturer supplied operator manuals for equipment

n. Qualified service organization list

PART 2 PRODUCTS

2.1 COMPONENTS

Provide components factory ordered for this project. Rebuilt equipment, warehoused equipment, or earlier generation equipment shall not be acceptable. Electrical and electronic devices not located within control panels shall have a NEMA 250 Type 1 enclosure in accordance with NEMA 250 unless otherwise specified. Actuators and positive positioners, and transmitters shall operate within temperature limit ratings of plus 35 to 150 degrees F. Panel mounted instruments shall operate within limit ratings of 35 to 120 degrees F and 10 percent to 95 percent relative humidity, noncondensing. Devices installed outdoors shall operate within limit ratings of minus 35 to 150 degrees F.

2.2 ACTUATORS

Provide electric actuators. Actuators shall function as required within 85 to 110 percent of their power supply rating. Actuators shall fail to their spring return positions on signal or power failure unless indicated as timed, power return actuators. Actuators shall have visible position indicators. Actuators shall open or close the devices to which they are applied within 60 seconds after a full scale signal input change.

2.2.1 Damper Actuators

Damper actuators shall be rated for at least 125 percent of the motive power necessary to operate the connected damper. The actuator stroke shall be limited by an adjustable stop in the direction of the return stroke. Actuators shall be provided with mounting and connecting hardware.

2.3 FIRE PROTECTION DEVICES

Provide in accordance with NFPA 90A, except as otherwise indicated.

2.3.1 Firestats

Firestats shall be UL an FM approved safety therostats as required by NFPA hazard classifications. The firestat shall be the adjustable type with a locking cover, auxiliary contacts and manual reset. Output control shall have contacts with a voltage and current rating double the applied load. Contacts shall directly de-energize the fan system if firstat is energized. Provide manual reset firestat at each of the following locations.

2.3.1.1 Install firestats in the inlet of each exhaust fan.

2.4 THERMOSTATS

Provide thermostats.

2.4.1 Ranges

Thermostat ranges shall be selected so that the setpoint is adjustable between plus or minus 10 degrees F of the setpoint indicated.

2.4.2 Nonmodulating Electric Room Thermostats

Contacts shall be single-pole double-throw (SPDT), hermetically sealed, and wired to identified terminals. Maximum differential shall be 2 degrees F. Thermostat covers shall consist of locking metal or heavy-duty plastic, and shall be capable of being locked by an Allen wrench or special tool. Thermostats shall have manual switches as required by the application and a minimum range of 55 to 90 degrees F.

2.5 CONTROL DEVICES AND ACCESSORIES

Provide control devices and accessories.

2.5.1 Relays

Relays shall be two-pole, double-throw (DPDT) with a 10-ampere resistive rating at 24 Vac, and shall have an enclosed coil. Provide with a light indicator which is lit when the coil is energized and is not lit when the coil is not energized.

2.6 CONTROL WIRING

Provide HVAC control wiring.

2.6.1 Wiring

a. Terminal blocks shall be insulated, modular, feed-through, clamp style with recessed captive screw-type clamping mechanisms.

Terminal blocks shall be rail mounted, and shall have end plates, partition plates or enclosed sides for separation.

b. Control wiring for 24-V circuits shall be 18 AWG minimum and shall be rated for 300-V service.

c. Wiring for circuits operating at more than 100 V shall be 14 AWG minimum and shall be rated for 600-V service.

PART 3 EXECUTION

3.1 INSTALLATION

Perform installation under the supervision of competent technicians regularly employed in the installation of control systems. Provide components for a complete and operational control system. Provide control system complete and ready for operation, as specified and indicated. Provide dielectric isolation where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exterior shall be watertight. Control system installation shall provide adequate clearance for control system maintenance by maintaining access spaces between coils, to mixed-air plenums, and as required to calibrate, remove, repair, or replace control system devices. Control system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance. Install devices mounted in or on piping or ductwork, on building surfaces, in mechanical and electrical spaces, or in occupied space ceilings in accordance with manufacturer's recommendations and as indicated on contract documents. Provide control devices to be installed in piping and ductwork with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Certify that installation of control system is complete and technical requirements of this section have been met.

3.1.1 Damper Actuators

Provide damper actuators so that the damper sealing action is smooth and sufficient to maintain leakage at or below specified leakage rate. Multiple actuators operating a common damper shall be connected to a common drive shaft.

3.1.2 Wiring

a. Provide wiring, including low-voltage wiring, in metallic raceways. Install wiring without splices between control devices, and equipment. Install instrumentation grounding as necessary to prevent ground loops, noise, and surges adversely affecting operation of the system. Tag cables, conductors, and wires at both ends, with identifiers indicated on shop drawings.

b. Other electrical work shall be specified in Section 16402N INTERIOR DISTRIBUTION SYSTEM. Provide step-down transformers where control equipment operates at lower than line circuit voltages. Transformers serving individual heating, ventilating, and air-conditioning units shall be fed from fan motor leads, or fed from the nearest distribution panelboard or motor control center, using circuits provided for that purpose.

c. Ground control panels and cabinets as specified in Section 16402N

INTERIOR DISTRIBUTION SYSTEM. Grounding of the green ac ground wire at the breaker panel alone is not adequate. Install ground wire from each control panel to adequate building ground.

3.1.3 Control Drawings

Post laminated copies of as-built control system drawings in equipment room.

3.2 ADJUSTMENTS

Calibrate instrumentation and controls, and verify specified accuracy using test equipment traceable to National Institute for Science and Technology (NIST) standards. Adjust controls and equipment to maintain conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

3.3 FIELD QUALITY CONTROL

a. Demonstrate compliance of control systems. Furnish personnel, equipment, instrumentation, and supplies necessary to perform calibration and site testing. Calibrate test equipment in accordance with NIST standards. Ensure that tests are performed or supervised by competent employees of the control system installer or the control system manufacturer regularly employed in testing and calibration of control systems.

b. Testing shall include field tests and the performance verification test. Field tests shall demonstrate proper calibration of instrumentation, input and output devices, and operation of specific equipment. The performance verification test shall ensure proper execution of sequence of operation and proper tuning of control loops.

c. The plan for each phase of field acceptance testing shall be approved in writing before beginning that phase of testing. Furnish written notification of planned testing to Contracting Officer at least 21 days prior to testing. Include proposed test procedures with notification. The Contractor will not be allowed to start testing without written Government approval of test procedures. Test procedures shall consist of detailed instructions for complete testing to prove the performance of heating, ventilating, and air-conditioning system and control system. Include the following tests in test procedures.

d. Submit original copies of data produced, including results of each test procedure, to the Government at the conclusion of each phase of testing. Tests are subject to supervision and approval by Contracting Officer. Do not perform testing during scheduled seasonal off-periods of heating and cooling systems.

3.3.1 Test Reporting

After completion or termination of field tests and again after the performance verification test, identify, determine causes, replace, repair, or calibrate equipment which fails to meet the specification; and deliver a written report to the Government. The report shall document test results, explain in detail the nature of each failure, and corrective action taken. After delivering the performance verification test report, the Contractor shall convene a test review meeting at the job site to present results and

recommendations to the Government. As a part of the test review meeting, the Contractor shall demonstrate by performing appropriate portions of field tests or the performance verification test that failures have been corrected. Based on Contractor's report and test review meeting, the Government will determine either the restart point or successful completion of testing. Do not commence required retesting until after receipt of written notification by the Government. At the conclusion of retesting, repeat the assessment.

3.3.2 Contractor's Field Testing

Calibrate field equipment and verify equipment and system operation before system is placed on-line. Include the following tests in field testing.

3.3.2.1 Wiring Integrity Tests

Test wiring for continuity, ground faults, and open and short circuits.

3.3.2.2 System Inspection

Observe HVAC control system in shutdown condition. Check dampers for proper normal positions. Document positions for the performance verification test report.

3.3.3 Field Test Documentation

Before scheduling the performance verification test, provide field test documentation and written certification of completion to Contracting Officer and the Naval Energy and Environmental Support Activity (NEESA), that the installed system has been calibrated, tested, and is ready to begin the performance verification test. Do not start the performance verification test prior to receiving written permission from the Government.

3.3.4 Performance Verification Test

Conduct the performance verification tests to demonstrate that the control system maintains setpoints and that the control loops are tuned for the correct sequence of operation. Conduct the performance verification test before final acceptance of work. Specifically, the performance verification test shall demonstrate that the HVAC system operates properly through the complete sequence of operation (e.g., seasonal, occupied and unoccupied, warm up, etc.), for specified control sequences. Demonstrate proper control system response for abnormal conditions for which there is a specified system or controls response by simulating these conditions. Demonstrate that hardware interlocks and safety devices work as designed. Demonstrate that the control system performs the correct sequence of control.

3.4 TRAINING

Provide a qualified instructor to conduct training courses for designated personnel in maintenance and operation of HVAC and control systems. Orientate training to the specific system being installed under the contract. Furnish audiovisual equipment and other training materials and supplies. A training day is defined as 8 hours of classroom or lab instruction, including two 15-minute breaks and excluding lunch time, Monday through Friday, during the daytime shift in effect at the training facility. For guidance, assume that the attendees have a high school education and are familiar with HVAC systems. Submit planned training

schedule, agenda, and class materials to the Government at least 45 days prior to training.

3.4.1 Training Course Documentation

Training shall be based on the operation and maintenance manuals and control system training manual. Deliver manuals for each trainee with two additional sets for archiving at the project site. Include an agenda, defined objectives, and a detailed description of subject matter for each lesson.

3.4.2 System Maintenance Training

Course shall be taught at the project site within one month after completion of endurance test for a period of 1 training day. Maximum of two personnel shall attend the course. Course shall include but not be limited to the following:

a. Physical layout for each piece of hardware

b. Troubleshooting and diagnostics procedures

c. Repair instructions

d. Preventive maintenance procedures and schedule

e. Calibration procedures

3.5 QUALIFIED SERVICE ORGANIZATION LIST

The qualified service organization list shall include names and telephone numbers of organizations qualified to service HVAC control systems.

-- End of Section --

SECTION 16050N

BASIC ELECTRICAL MATERIALS AND METHODS
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 709	(2001) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code
IEEE Std 100	(2000) IEEE Standard Dictionary of Electrical and Electronics Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C57.12.28	(1999) Pad-Mounted Equipment - Enclosure Integrity

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)

1.2 RELATED REQUIREMENTS

This section applies to certain sections of Division 2, "Site Construction," Division 11, "Equipment," and Division 15, "Mechanical". This section applies to all sections of Division 16, "Electrical," of this project specification unless specified otherwise in the individual sections.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical

sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 22.86/13.2 kV primary, three phase, four wire, 60 Hz, and 480Y/277 volts secondary, three phase, four wire. Final connections to the power distribution system at the existing overhead primary facilities shall be made by the Contractor as directed by the Contracting Officer.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Submittals required in the sections which refer to this section must also conform to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.5.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.5.2 Drawings

Submit drawings a minimum of 14 by 20 inches in size using a minimum scale of 1/8 inch per foot, except as specified otherwise. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.3 Instructions

Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are

received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

1.5.4 Certificates

Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5.4.1 Reference Standard Compliance

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

1.5.4.2 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.5 Operation and Maintenance Manuals

Comply with the requirements of Section 01781 OPERATION AND MAINTENANCE DATA and the technical sections.

1.5.5.1 Operating Instructions

Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on

the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.6.2 Regulatory Requirements

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

1.6.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4 Service Support

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.5 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.6.6 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer.

1.6.7 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.8 NAMEPLATES

ASTM D 709. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.9 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

a. When the enclosure integrity of such equipment is specified to be in accordance with NEMA C57.12.28, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.

1.10 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.11 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

1.12 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Mechanical isolation of machines and other equipment shall be in accordance with requirements of Division 15, "Mechanical."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF EQUIPMENT

3.1.1 Factory Applied

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test.

3.1.2 Field Applied

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

3.2 NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

SECTION 16081N

APPARATUS INSPECTION AND TESTING
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2003) Acceptance Testing Specifications

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Acceptance tests and inspections; G

SD-07 Certificates

Qualifications of organization, and lead engineering technician; G

Acceptance test and inspections procedure; G

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and generation equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor. No work required by this section of the specification shall be performed by a second tier subcontractor.

a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.

b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

1.4.2 Acceptance Tests and Inspections Reports

Submit certified copies of inspection reports and test reports. Reports shall include certification of compliance with specified requirements, identify deficiencies, and recommend corrective action when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

1.4.3 Acceptance Test and Inspections Procedure

Submit test procedure reports for each item of equipment to be field tested at least 45 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ACCEPTANCE TESTS AND INSPECTIONS

Testing organization shall perform acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Contracting Officer shall be notified at least 14 days in advance of when tests will be conducted by the testing organization. Perform acceptance tests and inspections on applicable equipment and systems specified in the following sections:

a. Section 16272N THREE-PHASE PAD-MOUNTED TRANSFORMERS

b. Section 16301N OVERHEAD TRANSMISSION AND DISTRIBUTION

c. Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION

3.2 SYSTEM ACCEPTANCE

Final acceptance of the system is contingent upon satisfactory completion

of acceptance tests and inspections.

3.3 PLACING EQUIPMENT IN SERVICE

A representative of the approved testing organization shall be present when equipment tested by the organization is initially energized and placed in service.

-- End of Section --

SECTION 16272N

THREE-PHASE PAD-MOUNTED TRANSFORMERS
08/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM D 117	(2002) Sampling, Test Methods, Specifications for Electrical Insulating Oils of Petroleum Origin
ASTM D 1535	(2001) Specifying Color by the Munsell System
ASTM D 3487	(2000) Mineral Insulating Oil Used in Electrical Apparatus

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C12.7	(1993; R 1999) Requirements for Watthour Meter Sockets
IEEE C2	(2002) National Electrical Safety Code
IEEE C57.12.00	(2000) General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.80	(2002) Terminology for Power and Distribution Transformers
IEEE C57.12.90	(1999) Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.13	(1993) Requirements for Instrument Transformers
IEEE C57.98	(1994) Guide for Transformer Impulse Tests
IEEE C62.11	(1999) Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1KV)
IEEE Std 386	(1995) Separable Insulated Connector Systems for Power Distribution Systems Above 600V

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2003) Acceptance Testing Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C12.1	(2001) Code for Electricity Metering
NEMA C12.10	(1997) Watthour Meters
NEMA C37.47	(1981) Distribution Fuse Disconnecting Switches, Fuse Supports, and Current-Limiting Fuses**
NEMA C57.12.26	(1993) Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, High-Voltage, 34 500 Grd Y/19 920 Volts and Below; 2500 kVA and Smaller
NEMA C57.12.28	(1999) Pad-Mounted Equipment - Enclosure Integrity
NEMA C57.12.29	(1999; E 2000) Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, and Section 16081N APPARATUS INSPECTION AND TESTING, apply to this section, with the additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Code 074, Southern Division, Naval Facilities Engineering Command will review and approve all submittals in this section requiring Government approval. As an exception to this paragraph, transformers manufactured by ABB in Jefferson City, MO; by Cooper Power Systems in Waukesha, WI; by GE in Shreveport, LA; or by Howard Industries in Laurel, MS need not meet the submittal requirements of this contract. Instead, the following shall be submitted:

a. A certification, from the manufacturer, that the technical requirements of this specification shall be met.

b. An outline drawing of the transformer with devices identified (paragraph entitled "Pad-Mounted Transformer Drawings", item a).

c. ANSI nameplate data of the transformer (paragraph entitled "Pad-Mounted Transformer Drawings", item b).

d. Routine and other tests (in PART 2, see paragraph entitled "Routine and Other Tests"), shall be conducted by the manufacturer and will be witnessed by the government (in Part 2, see paragraph entitled "Source Quality Control"). Provide transformer test schedule required by submittal item "SD-11 Closeout Submittals". Provide certified copies of the tests.

e. Provide acceptance test reports required by submittal item "SD-06 Test Reports".

f. Provide operation and maintenance manuals required by submittal item "SD-10 Operation and Maintenance Data".

SD-02 Shop Drawings

Pad-mounted transformer drawings; G

SD-03 Product Data

Pad-mounted transformers; G

SD-06 Test Reports

Acceptance checks and tests; G

SD-07 Certificates

Transformer losses; G

SD-09 Manufacturer's Field Reports

Pad-mounted transformer design tests; G

Pad-mounted transformer routine and other tests; G

SD-10 Operation and Maintenance Data

Transformer(s), Data Package 5; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Transformer test schedule; G

1.4 QUALITY ASSURANCE

1.4.1 Pad-Mounted Transformer Drawings

Drawings shall indicate, but not be limited to the following:

a. An outline drawing, with front, top, and side views.

b. ANSI nameplate data.

c. Elementary diagrams and wiring diagrams with terminals identified of watthour meter and current transformers.

d. One-line diagram, including switch(es), current transformers, meters, and fuses.

e. Manufacturer's published time-current curves (on full size logarithmic paper) of the transformer high side fuses.

1.4.2 Transformer Losses

Submit certification from the manufacturer indicating conformance with the paragraph entitled "Specified Transformer Losses."

1.4.3 Transformer Product Data

Submittal shall include manufacturer's information for each component, device, and accessory provided with the transformer.

1.4.4 Test Results

Submit report of test results as specified by paragraph entitled "Field Quality Control"

1.5 MAINTENANCE

1.5.1 Additions to Operation and Maintenance Data

In addition to requirements of Data Package 5, include the following on the actual transformer(s) provided:

a. An instruction manual with pertinent items and information highlighted

b. An outline drawing, front, top, and side views

c. Prices for spare parts and supply list

d. Routine and field acceptance test reports

e. Fuse curves for primary fuses

f. Information on watthour demand meter, CT's, and fuse block

g. Actual nameplate diagram

h. Date of purchase

1.5.2 Operation and Maintenance Data

Submit operation and maintenance data in accordance with Section 01781 OPERATION AND MAINTENANCE DATA and as specified herein.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be pad-mounted transformers and related accessories are specified in Section 16301N OVERHEAD TRANSMISSION AND DISTRIBUTION, Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION, and Section 16402N INTERIOR DSITRIBUTION SYSTEM.

2.2 THREE-PHASE PAD-MOUNTED TRANSFORMERS

NEMA C57.12.26, NEMA C57.12.28, NEMA C57.12.29 and as specified herein.

2.2.1 Compartments

The high- and low-voltage compartments shall be separated by steel isolating barriers extending the full height and depth of the compartments. Compartment doors: hinged lift-off type with stop in open position and three-point latching.

2.2.1.1 High Voltage, Dead-Front

High-voltage compartment shall contain the incoming line, insulated high-voltage load-break connectors, bushing well inserts, six high-voltage bushing wells configured for loop feed application, load-break switch handle(s), access to oil-immersed fuses, dead-front surge arresters, tap changer handle, connector parking stands and ground pad.

a. Insulated high-voltage load-break connectors: IEEE Std 386, rated 15 kV, 125 kV BIL. Current rating: 200 amperes rms continuous. Short time rating: 10,000 amperes rms symmetrical for a time duration of 0.17 seconds. Connector shall have a steel reinforced hook-stick eye, grounding eye, test point, and arc-quenching contact material.

b. Bushing well inserts: IEEE Std 386, 200 amperes, 15 kV Class. Provide a bushing well insert for each bushing well unless indicated otherwise.

c. Load-break switch

   Radial-feed oil-immersed type rated at 15 kV, 125 kV BIL, with a continuous current rating and load-break rating of 200 amperes, and a make-and-latch rating of 10,000 rms amperes symmetrical. Locate the switch handle in the high-voltage compartment.

d. Provide bayonet type, oil-immersed, expulsion fuses in series with oil-immersed, partial-range, current-limiting fuses. Bayonet fuse links shall sense both high currents and high oil temperature in order to provide thermal protection to the transformer. Coordinate transformer protection with expulsion fuse clearing low-current faults and current-limiting fuse clearing high-current faults beyond the interrupting rating of the expulsion fuse. In order to eliminate or minimize oil spills, the bayonet fuse assembly shall include an oil retention valve inside the housing which closes when the fuse holder is removed and an external drip shield. Warning shall be conspicuously

displayed within the high-voltage compartment cautioning against removing or inserting fuses unless the load-break switch is in the open position and the tank pressure has been released.

Bayonet fuse assembly: 150 kV BIL.

Oil-immersed current-limiting fuses: NEMA C37.47; 50,000 rms amperes symmetrical interrupting rating at the system voltage specified.

e. Surge arresters: IEEE C62.11, rated 10 kV, fully shielded, dead-front, metal-oxide-varistor, elbow type with resistance-graded gap, suitable for plugging into inserts. Provide three arresters for radial feed circuits.

f. Parking stands: Provide a parking stand near each bushing well.

2.2.1.2 Low Voltage

Low-voltage compartment shall contain low-voltage bushings with NEMA spade terminals, accessories, metering, stainless steel or laser-etched anodized aluminum diagrammatic transformer nameplate, and ground pad.

a. Accessories shall include drain valve with sampler device, fill plug, pressure relief device, liquid level gage, pressure-vacuum gage, and dial type thermometer with maximum temperature indicator.

b. Metering: NEMA C12.10. Provide a socket-mounted electronic programmable outdoor watthour meter, surface mounted flush against the side of the low-voltage compartment as indicated. Meter shall either be programmed at the factory or shall be programmed in the field. When field programming is performed, turn field programming device over to the Contracting Officer at completion of project. Meter shall be coordinated to system requirements.

1. Design: Provide meter designed for use on a 3-phase, 4-wire, 480Y/277 volt system with 3 current transformers. Include necessary KYZ pulse initiation hardware for Energy Monitoring and Control System (EMCS).

2. Coordination: Provide meter coordinated with ratios of current transformers and transformer secondary voltage.

3. Class: 20; Form: 9S; Accuracy: +/- 1.0 percent; Finish: Class II

4. Cover: Polycarbonate and lockable to prevent tampering and unauthorized removal.

5. Kilowatt-hour Register: 5 digit electronic programmable type

6. Demand Register:

(a) Provide solid state

(b) Meter reading multiplier:

(1) Indicate multiplier on the meter face.

(c) Demand interval length: shall be programmed for 15 minutes with rolling demand up to six subintervals per interval.

7. Meter fusing: Provide a fuse block mounted in the secondary compartment containing one fuse per phase to protect the voltage input to the watthour meter. Size fuses as recommended by the meter manufacturer.

8. Socket: IEEE C12.7. Provide NEMA Type 3R, box-mounted socket having automatic circuit-closing bypass and having jaws compatible with requirements of the meter. Cover unused hub openings with blank hub plates. Paint box Munsell 7GY3.29/1.5 green to match the pad-mounted transformer to which the box-mounted socket is attached. The Munsell color notation is specified in ASTM D 1535.

9. Current transformers: IEEE C57.13. Provide butyl-molded window type current transformers with 600-volt insulation, 10 kV BIL and mount on the low-voltage bushings. Route current transformer leads in a location as remote as possible from the power transformer secondary cables to permit current measurements to be taken with hook-on-ammeters. Provide three current transformers per power transformer with characteristics listed in the following table.

kVA	Sec. Volt	CT Ratio	RF	Meter Acc. Class
225	480Y/277	200/5	4.0	0.3 thru B-0.1

2.2.2 Transformer

a. Oil-insulated, two winding, 60 hertz, 65 degrees C rise above a 30 degrees C average ambient, self-cooled type.

b. Transformer shall be rated 225 kVA, 125 kV BIL.

c. Transformer voltage ratings: 13,800 V (Delta)- 480Y/277 V. For GrdY - GrdY transformers, provide transformer with five-legged core design for third harmonic suppression.

d. Tap changer shall be externally operated, manual type for changing tap setting when the transformer is de-energized. Provide four 2.5 percent full capacity taps, two above and two below rated primary voltage. Tap changers shall clearly indicate which tap setting is in use.

e. Minimum tested impedance shall not be less than 3.76 percent at 85 degrees C.

f. Audible sound levels shall comply with the following:

kVA	DECIBELS (MAX)
75	51
112.5	55
150	55
225	55
300	55
500	56
750	57
1000	58
1500	60

g. Transformer shall include lifting lugs and provisions for jacking under base. The transformer base construction shall be suitable for using rollers or skidding in any direction. Provide transformer top with an access handhole. Transformer shall have its kVA rating conspicuously displayed on its enclosure. The transformer shall have an insulated low-voltage neutral bushing with NEMA spade terminal, and with removable ground strap.

2.2.2.1 Specified Transformer Losses

No-load losses (NLL) shall be 413 watts at 20 degrees C and load losses (LL) shall be 1620 watts at 85 degrees C. The values for the specified losses shall be used for comparison with the losses determined during the routine tests. If the routine test values for no-load losses exceed the specified no-load losses by more than 10 percent, or the total losses exceed the specified total losses (sum of no-load and load losses) by more than 6 percent, the transformer is unacceptable.

2.2.3 Insulating Liquid

a. Mineral oil: ASTM D 3487, Type II, tested in accordance with ASTM D 117. Provide identification of transformer as "non-PCB" and "Type II mineral oil" on the nameplate.

2.2.3.1 Liquid-Filled Transformer Nameplates

Power transformers shall be provided with nameplate information in accordance with IEEE C57.12.00 and as modified or supplemented by this section.

2.2.4 Corrosion Protection

Bases and cabinets of transformers shall be corrosion resistant and shall be fabricated of stainless steel conforming to ASTM A 167, Type 304 or 304L. Base shall include any part of pad-mounted transformer that is within 3 inches of concrete pad. Paint bases, cabinets, and tanks Munsell 7GY3.29/1.5 green. Paint coating system shall comply with NEMA C57.12.28 regardless of base, cabinet, and tank material. The Munsell color notation is specified in ASTM D 1535.

2.3 WARNING SIGNS

Provide as specified in Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS.

2.4 GROUNDING AND BONDING

UL 467. Provide grounding and bonding as specified in Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBTTION.

2.5 PADLOCKS

Padlocks shall be provided for pad-mounted equipment. Padlocks shall be keyed as directed by the Contracting Officer. Padlocks shall comply with Section 08710 DOOR HARDWARE.

2.6 CAST-IN-PLACE CONCRETE

Concrete associated with electrical work for other than encasement of

underground ducts shall be 4000 psi minimum 28-day compressive strength unless specified otherwise. All concrete shall conform to the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

2.7 SOURCE QUALITY CONTROL

2.7.1 Transformer Test Schedule

The Government will witness tests. Provide transformer test schedule for tests to be performed at the manufacturer's test facility. Submit required test schedule and location, and notify the Contracting Officer 30 calendar days before scheduled test date. Notify Contracting Officer 15 calendar days in advance of changes to scheduled date.

a. Test Instrument Calibration

1. The manufacturer shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy.

2. The accuracy shall be directly traceable to the National Institute of Standards and Technology.

3. Instrument calibration frequency schedule shall not exceed 12 months for both test floor instruments and leased specialty equipment.

4. Dated calibration labels shall be visible on all test equipment.

5. Calibrating standard shall be of higher accuracy than that of the instrument tested.

6. Keep up-to-date records that indicate dates and test results of instruments calibrated or tested. For instruments calibrated by the manufacturer on a routine basis, in lieu of third party calibration, include the following:

(a) Maintain up-to-date instrument calibration instructions and procedures for each test instrument.

(b) Identify the third party/laboratory calibrated instrument to verify that calibrating standard is met.

2.7.2 Design Tests

IEEE C57.12.00, and IEEE C57.12.90. Section 5.1.2 in IEEE C57.12.80 states that "design tests are made only on representative apparatus of basically the same design." Submit design test reports (complete with test data, explanations, formulas, and results), in the same submittal package as the catalog data and drawings for the specified transformer(s). Design tests shall have been performed prior to the award of this contract.

a. Tests shall be certified and signed by a registered professional engineer.

b. Temperature rise: "Basically the same design" for the temperature rise test means a pad-mounted transformer with the same coil construction (such as wire wound primary and sheet wound secondary), the same kVA, the same cooling type (ONAN), the same temperature rise rating, and the

same insulating liquid as the transformer specified.

c. Lightning impulse: "Basically the same design" for the lightning impulse dielectric test means a pad-mounted transformer with the same BIL, the same coil construction (such as wire wound primary and sheet wound secondary), and a tap changer, if specified. Design lightning impulse tests shall include both the primary and secondary windings of that transformer.

1. IEEE C57.12.90, paragraph 10.3 entitled "Lightning Impulse Test Procedures," and IEEE C57.98.

2. State test voltage levels.

3. Provide photographs of oscilloscope display waveforms or plots of digitized waveforms with test report.

d. Lifting and moving devices: "Basically the same design" requirement for the lifting and moving devices test means a test report confirming that the lifting device being used is capable of handling the weight of the specified transformer in accordance with NEMA C57.12.26.

e. Pressure: "Basically the same design" for the pressure test means a pad-mounted transformer with a tank volume within 30 percent of the tank volume of the transformer specified.

2.7.3 Routine and Other Tests

IEEE C57.12.00. Routine and other tests shall be performed by the manufacturer on the actual transformer(s) prepared for this project to ensure that the design performance is maintained in production. Submit test reports, by serial number and receive approval before delivery of equipment to the project site. Required tests and testing sequence shall be as follows:

a. Cold resistance measurements (provide reference temperature)

b. Phase relation

c. Ratio

d. No-load losses (NLL) and excitation current

e. Load losses (LL) and impedance voltage

f. Dielectric

1. Impulse

1. Impulse: In addition to the routine impulse tests specified in IEEE C57.12.90 paragraph 10.4 entitled "Routine Impulse Test for Distribution Transformers," perform the complete design type lightning impulse tests on transformer per IEEE C57.12.90 paragraph 10.3 entitled "Lightning Impulse Test Procedures," and IEEE C57.98. Test the primary winding only.

(a) State test voltage levels

(b) Provide photographs of oscilloscope display waveforms or

plots of digitized waveforms with test reports. As an alternative, photographs of oscilloscope display waveforms or plots of digitized waveforms may be hand-delivered at the factory witness test.

(c) The Officer in Charge (OIC) will select the transformers to be tested.

2. Applied voltage

3. Induced voltage

g. Leak

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to requirements specified herein. Provide new equipment and materials unless indicated or specified otherwise.

3.2 TRANSFORMER GROUNDING

Provide a 1/0 bare copper-ground girdle around transformer. Girdle shall be buried one foot deep and placed 3 feet laterally from the transformer enclosure. Connect girdle to enclosure at two opposite places using 1/0 copper. Exothermically weld joints.

3.3 INSTALLATION OF EQUIPMENT AND ASSEMBLIES

Install and connect pad-mounted transformers furnished under this section as indicated on project drawings, the approved shop drawings, and as specified herein.

3.3.1 Meters and Current Transformers

NEMA C12.1.

3.4 FOUNDATION FOR EQUIPMENT AND ASSEMBLIES

Mount transformer on concrete slab. Unless otherwise indicated, the slab shall be at least 8 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab shall be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab shall be approximately 4 inches above finished grade with gradual slope for drainage. Edges above grade shall have 1/2 inch chamfer. Slab shall be of adequate size to project at least 8 inches beyond the equipment.

Stub up conduits, with bushings, 2 inches into cable wells in the concrete pad. Coordinate dimensions of cable wells with transformer cable training areas.

3.4.1 Cast-In-Place Concrete

Cast-in-place concrete work shall conform to the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

3.5 FIELD QUALITY CONTROL

3.5.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.5.1.1 Pad-Mounted Transformers

a. Visual and mechanical inspection

1. Compare equipment nameplate information with specifications and approved shop drawings.

2. Inspect physical and mechanical condition. Check for damaged or cracked insulators and leaks.

3. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.

4. Verify correct liquid level in tanks.

5. Perform specific inspections and mechanical tests as recommended by manufacturer.

6. Verify correct equipment grounding.

7. Verify the presence of transformer surge arresters.

b. Electrical tests

1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.

2. Perform insulation-resistance tests.

3. Perform turns-ratio tests.

4. Perform insulation power-factor/dissipation-factor tests on windings.

5. Sample insulating liquid. Sample shall be tested for:

(a) Dielectric breakdown voltage

(b) Acid neutralization number

(c) Specific gravity

(d) Interfacial tension

(e) Color

(f) Visual condition

(g) Water in insulating liquid

(h) Measure dissipation factor or power factor

6. Perform dissolved gas analysis (DGA).

7. Test for presence of PCB.

8. Verify that the tap-changer is set at specified ratio.

9. Verify proper secondary voltage phase-to-phase and phase-to-neutral after energization and prior to loading.

3.5.1.2 Current Transformers

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.

2. Inspect physical and mechanical condition.

3. Verify correct connection.

4. Verify that adequate clearances exist between primary and secondary circuit.

5. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.

6. Verify that required grounding and shorting connections provide good contact.

b. Electrical tests

1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.

2. Perform insulation-resistance test.

3. Perform a polarity test.

4. Perform a ratio-verification test.

3.5.1.3 Watthour Meter

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specifications and approved shop drawings.

2. Inspect physical and mechanical condition.

3. Verify tightness of electrical connections.

b. Electrical tests

1. Calibrate watthour meters according to manufacturer's published

data.

2. Verify that correct multiplier has been placed on face of meter, where applicable.

3. Verify that current transformer secondary circuits are intact.

3.5.1.4 Grounding System

a. Visual and mechanical inspection

1. Inspect ground system for compliance with contract plans and specifications.

3.5.2 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --

SECTION 16301N

OVERHEAD TRANSMISSION AND DISTRIBUTION
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)

ATIS O5.1	(2002; Supp 2003) Specifications and Dimensions (for Wood Poles)

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C1	(2000) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C25	(2001) Sawn Crossarms - Preservative Treatment by Pressure Processes
AWPA C4	(1999) Poles - Preservative Treatment by Pressure Processes

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B 1	(2001) Hard-Drawn Copper Wire
ASTM B 2	(2000) Medium-Hard-Drawn Copper Wire
ASTM B 3	(2001) Soft or Annealed Copper Wire

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code
IEEE C62.11	(1999) Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1KV)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C29.5	(1984; R 2002) Wet-Process Porcelain Insulators - Low- and Medium-Voltage Types**
NEMA C37.42	(1996) High Voltage Expulsion Type Distribution Class Fuses, Cutouts, Fuse Disconnecting Switches and Fuse Links**

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS 1728F-700	(1993) Wood Poles, Stubs, and Anchor Logs (DT-5C)
RUS 1728H-701	(1993) Wood Crossarms Transmission Timbers and Pole Keys
RUS 202-1	(2001; Supp. 2002) List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers

UNDERWRITERS LABORATORIES (UL)

UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 6	(2000; Rev thru May 2003) Rigid Metal Conduit

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS and Section 16081N APPARATUS INSPECTION AND TESTING apply to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Code 074, Southern Division, Naval Facilities Engineering Command will review and approve transformer submittals. As an exception to this paragraph, transformers manufactured by ABB in Athens, GA; by Cooper Power Systems in Waukesha, WI or Nacogdoches, TX; or by Howard Industries in Laurel, MS need not meet the submittal requirements of this contract. Instead, the following shall be submitted.

a. A certification, from the manufacturer, that the technical requirements of this specification shall be met.

b. Routine and other tests (paragraph entitled "Routine and Other Tests, shall be conducted by the manufacturer and will be witnessed by the Government (paragraph entitled "Source Quality Control"). Provide certified copies of the tests.

c. Provide field test reports (paragraph entitled "Field Quality Control").

SD-03 Product Data

Conductors; G

Insulators; G

Wood Poles

Nameplates; G

Cutouts; G

Surge arresters; G

SD-05 Design Data

SD-06 Test Reports

Wood Crossarm Inspection Report

Field Test Plan; G

Field Quality Control; G

Ground resistance test reports; G

Submit report of the acceptance test results as specified by paragraph entitled "Field Quality Control"

SD-07 Certificates

Wood poles; G

Wood crossarms; G

Submit certification from the manufacturer indicating conformance with the paragraph entitled "Specified Transformer Losses."

SD-09 Manufacturer's Field Reports

SD-11 Closeout Submittals

1.4 QUALITY ASSURANCE

1.4.1 Ground Resistance Test Reports

Submit the measured ground resistance of grounding system. When testing grounding electrodes and grounding systems, identify each grounding electrode and each grounding system for testing. Include the test method and test setup (i.e. pin location) used to determine ground resistance and soil conditions at the time the measurements were made.

1.4.2 Wood Crossarm Inspection Report

Furnish an inspection report from an independent inspection agency, approved by the Contracting Officer, stating that offered products comply with applicable AWPA and RUS standards. The RUS approved Quality Mark "WQC" on each crossarm will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.2.1 Field Test Plan

Provide a proposed field test plan 30 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

1.5 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements. Wood poles held in storage for more than 2 weeks shall be stored in accordance with ATIS O5.1. Handling of wood poles shall be in accordance with ATIS O5.1, except that pointed tools capable of producing indentations more than inch in depth shall not be used. Nails and holes are not permitted in top of poles. Metal poles shall be handled and stored in accordance with the manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Consider materials specified herein or shown on contract drawings which are identical to materials listed in RUS 202-1 as conforming to requirements.

2.2 POLES

Poles shall be of lengths and classes indicated.

2.2.1 Wood Poles

Wood poles machine trimmed by turning, Southern Yellow Pine conforming to ATIS O5.1 and RUS 1728F-700. Gain, bore and roof poles before treatment. Should additional gains be required subsequent to treatment, metal gain plates shall be provided. Pressure treat poles with pentachlorophenol, except that Douglas Fir and Western Larch poles shall not be treated with CCA in accordance with AWPA C1 and AWPA C4 as referenced in RUS 1728F-700. The quality of each pole shall be ensured with "WQC" (wood quality control) brand on each piece, or by an approved inspection agency report.

2.3 CROSSARMS

2.3.1 Wood Crossarms

Conform to RUS 1728H-701. Pressure treat crossarms with pentachlorophenol, chromated copper arsenate (CCA), or ammoniacal copper arsenate (ACA). Treatment shall conform to AWPA C25. Crossarms shall be solid wood, distribution type, and a 1/4 inch 45 degree chamfer on all top edges. Cross-sectional area minimum dimensions shall be 4-1/4 inches in height by 3-1/4 inches in depth in accordance with IEEE C2 for Grade B construction. Crossarms shall be 8 feet in length, except that 10 foot crossarms shall be used for crossarm-mounted banked single-phase transformers or elsewhere as indicated. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment. Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators, and for four suspension insulators, except where

otherwise indicated or required. Drilling shall provide required climbing space and wire clearances. Crossarms shall be straight and free of twists to within 1/10 inch per foot of length. Bend or twist shall be in one direction only.

2.3.2 Crossarm Braces

Provide flat steel or steel angle as indicated. Provide braces with 38 inch span for 8 foot crossarms.

2.4 HARDWARE

Hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M.

2.5 INSULATORS

Provide wet-process porcelain insulators which are radio interference free.

a. Pin insulators: NEMA C29.5, Class 55-6.

2.6 OVERHEAD CONDUCTORS

Conductors of bare copper of sizes and types indicated.

2.6.1 Solid Copper

ASTM B 1, ASTM B 2, and ASTM B 3, hard-drawn, medium-hard-drawn, and soft-drawn, respectively. ASTM B 8, stranded.

2.7 GROUND RODS

Copper clad steel ground rods at least 3/4 inch in diameter and 10 feet long. Die-stamp each near top with name or trademark of manufacturer and length of rod in feet. Rods shall have a hard, clean, smooth, continuous, surface throughout length of rod.

2.7.1 Ground Wire

Provide soft drawn copper wire ground conductors a minimum No. 4 AWG. Ground wire protectors may be either PVC or half round wood molding. Wood molding shall be fir, pressure treated in accordance with AWPA C25, or shall be cypress or cedar.

2.8 SURGE ARRESTERS

IEEE C62.11, metal oxide, porcelain housed, surge arresters arranged for crossarm mounting. RMS voltage rating shall be 10 kV. Arresters shall be Distribution class.

2.9 FUSED CUTOUTS

Open type fused cutouts rated 100 amperes and 12,000 amperes symmetrical interrupting current at 15/26 kV gnd Y, conforming to NEMA C37.42. Type K fuses conforming to NEMA C37.42 with ampere ratings as indicated. Open link type fuse cutouts are not acceptable.

2.10 CONDUIT RISERS AND CONDUCTORS

The riser shield shall be PVC containing a PVC back plate and PVC extension

shield or a rigid galvanized steel conduit, as indicated, and conforming to UL 6. Provide conductors and terminations as specified in Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION

2.11 ELECTRICAL TAPES

Tapes shall be UL listed for electrical insulation and other purposes in wire and cable splices. Terminations, repairs and miscellaneous purposes, electrical tapes shall comply with UL 510.

2.12 CALKING COMPOUND

Compound for sealing of conduit risers shall be of a puttylike consistency workable with hands at temperatures as low as 35 degrees F, shall not slump at a temperature of 300 degrees F, and shall not harden materially when exposed to air. Compound shall readily calk or adhere to clean surfaces of the materials with which it is designed to be used. Compound shall have no injurious effects upon the workmen or upon the materials.

PART 3 EXECUTION

3.1 INSTALLATION

Provide overhead pole line installation conforming to requirements of IEEE C2 for Grade B construction of overhead lines in medium loading districts and NFPA 70 for overhead services. Provide material required to make connections into existing system and perform excavating, backfilling, and other incidental labor. Consider street, alleys, roads and drives "public." Pole configuration shall be as indicated.

3.1.1 Wood Pole Installation

Provide pole holes at least as large at the top as at the bottom and large enough to provide 4 inch clearance between the pole and side of the hole.

3.1.1.1 Setting Depth of Pole

Pole setting depths shall be as follows:

Length of Pole (feet)	Setting in Soil (feet)	Setting in Solid Rock (feet)
20	5.0	3.0
25	5.5	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0

3.1.1.2 Setting in Soil, Sand, and Gravel

"Setting in Soil" depths, as specified in paragraph entitled "Setting Depth of Pole," apply where the following occurs:

a. Where pole holes are in soil, sand, or gravel or any combination of these;

b. Where soil layer over solid rock is more than 2 feet deep;

c. Where hole in solid rock is not substantially vertical; or

d. Where diameter of hole at surface of rock exceeds twice the diameter of pole at same level.

3.1.1.3 Setting in Solid Rock

"Setting in Solid Rock," as specified in paragraph entitled "Setting Depth of Pole," applies where poles are to be set in solid rock and where hole is substantially vertical, approximately uniform in diameter and large enough to permit use of tamping bars the full depth of hole.

3.1.1.4 Setting With Soil Over Solid Rock

Where a layer of soil 2 feet or less in depth over solid rock exists, depth of hole shall be depth of soil in addition to depth specified under "Setting in Solid Rock" in paragraph entitled "Setting Depth of Pole," provided, however, that such depth shall not exceed depth specified under "Setting in Soil."

3.1.1.5 Setting on Sloping Ground

On sloping ground, always measure hole depth from low side of hole.

3.1.1.6 Backfill

Thoroughly tamp pole backfill for full depth of the hole and mound excess fill around the pole.

3.1.1.7 Setting Poles

Set poles so that alternate crossarm gains face in opposite directions, except at terminals and dead ends where gains of last two poles shall be on side facing terminal or dead end. On unusually long spans, set poles so that crossarm comes on side of pole away from long span. Where pole top pins are used, they shall be on opposite side of pole from gain, with flat side against pole.

3.1.1.8 Alignment of Poles

Set poles in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain. Set not less than 2 inches for each 10 feet of pole length above grade, nor more than 4 inches for each 10 feet of pole length after conductors are installed at required tension. When average ground run is level, consecutive poles shall not vary more than 5 feet in height. When ground is uneven, poles differing in length shall be kept to a minimum by locating poles to avoid the highest and lowest ground points. If it becomes necessary to shorten a pole, a piece shall be sawed off the top. Holes shall be dug large enough to permit the proper use of tampers to full depth of hole.

3.1.1.9 Pole Caps

Provide plastic pole caps with 1/4 inch sealing rings and four nailing tabs. Fill sealing area with either a bituminous, elastigum roof cement or

an acceptable preservative paste to level of sealing ring to eliminate possibility of condensation. Place on pole top and nail each tab down with a 1 1/4 inch nail.

3.1.2 Hardware

Provide hardware with washer against wood and with nuts and lock nuts applied wrench tight. Provide locknuts on threaded hardware connections. Locknuts shall be M-F style and not palnut style.

3.1.3 Grounding

Unless otherwise indicated, grounding shall conform to IEEE C2. Pole grounding electrodes shall have a resistance to ground not exceeding 25 ohms. When work in addition to that indicated or specified is directed in order to obtain specified ground resistance, provisions of the contract covering changes shall apply.

3.1.3.1 Ground Rod Connections

Make ground rod connections on pole lines by exothermic weld or by using a compression connector for ground wire or wire to rod connections. Make exothermic welds strictly in accordance with manufacturer's written recommendations. Welds which have puffed up or which show convex surfaces indicating improper cleaning, are not acceptable. No mechanical connectors are required at exothermic weldments. Compression connectors shall be type that uses a hydraulic compression tool to provide correct pressure. Provide tools and dies recommended by compression connector manufacturer. An embossing die code or similar method shall provide visible indication that a connector has been fully compressed on ground wire.

3.1.3.2 Grounding and Grounded Connections

a. Where no primary or common neutral exists, surge arresters and frames of equipment operating at over 750 volts shall be bonded together and connected to a dedicated primary grounding electrode.

b. Where no primary or common neutral exists, transformer secondary neutral bushing, secondary neutral conductor, and frames of equipment operating at under 750 volts shall be bonded together and connected to a dedicated secondary grounding electrode.

c. When a primary or common neutral exists, connect all grounding and grounded conductors to a common grounding electrode.

3.1.3.3 Protective Molding

Protect grounding conductors which are run on surface of wood poles by wood molding or plastic molding of equal mechanical strength extending from ground line throughout communication and transformer spaces.

3.1.4 CONDUCTOR INSTALLATION

3.1.4.1 Connectors and Splices

Conductor splices, as installed, shall exceed ultimate rated strength of conductor and shall be of type recommended by conductor manufacturer. No splice shall be permitted within 10 feet of a support. Connectors and splices shall be mechanically and electrically secure under tension and

shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors shall be noncorrosive and shall not adversely affect conductors. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer. Primary line apparatus taps shall be by means of hot line clamps attached to compression type bail clamps (stirrups). Low-voltage connectors for copper conductors shall be of the solderless pressure type. Noninsulated connectors shall be smoothly taped to provide a waterproof insulation equivalent to the original insulation, when installed on insulated conductors. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper.

3.1.4.2 Conductor-To-Insulator Attachments

Conductors shall be attached to insulators by means of clamps, shoes or tie wires, in accordance with the type of insulator. For insulators requiring conductor tie-wire attachments, tie-wire sizes shall be as indicated in TABLE II.

TABLE II

TIE-WIRE REQUIREMENTS

CONDUCTOR Copper (AWG)	TIE WIRE Soft-Drawn Copper (AWG)
6	8
4 and 2	6
1 through 3/0	4
4/0 and larger	2
AAC, AAAC, or ACSR (AWG)	AAAC OR AAC (AWG)
Any size	6 or 4

3.1.4.3 Armor Rods

Armor rods shall be provided for AAC, AAAC, and ACSR conductors. Armor rods shall be installed at supports, except armor rods will not be required at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. For span lengths of less than 200 feet, flat aluminum armor rods may be used. Flat armor rods, not less than 0.03 by 0.25 inch shall be used on No. 1 AWG AAC and AAAC and smaller conductors and on No. 5 AWG ACSR and smaller conductors. On larger sizes, flat armor rods shall be not less than 0.05 by 0.30 inches. For span lengths of 200 feet or more, preformed round armor rods shall be used.

3.1.4.4 Ties

Provide ties on pin insulators tight against conductor and insulator and ends turned down flat against conductor so that no wire ends project.

3.1.4.5 Aluminum Connections

Make aluminum connections to copper or other material using only splices, connectors, lugs, or fittings designed for that specific purpose. Keep a copy of manufacturer's instructions for applying these fittings at job site for use of the inspector.

3.1.5 Risers

Secure galvanized steel conduits on poles by two hole galvanized steel pipe straps spaced as indicated and within 3 feet of any outlet or termination. Ground metallic conduits.

3.2 FIELD QUALITY CONTROL

3.2.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 14 days prior to conducting tests. The Contractor shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field reports will be signed and dated by the Contractor.

3.2.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.2.3 Grounding System

a. Visual and mechanical inspection

(1) Inspect ground system for compliance with contract plans and specifications.

b. Electrical tests

(1) Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

3.2.4 Devices Subject to Manual Operation

Each device subject to manual operation shall be operated at least three

times, demonstrating satisfactory operation each time.

3.2.5 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --

SECTION 16302N

UNDERGROUND TRANSMISSION AND DISTRIBUTION
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C119.1	(2002) Sealed Insulated Underground Connector Systems Rated 600 Volts
ANSI C2	(1997) National Electrical Safety Code

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(2001) Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 404	(2000) Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V Through 500 000 V
IEEE Std 48	(1996; R 2003) Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2003) Acceptance Testing Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA TC 2	(2003) Electrical Polyvinyl Chloride (PVC) Tubing (EPT) and Conduit
NEMA TC 3	(1999) PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA WC 8	(1988; Rev 3 1996) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

NFPA 70B (2002) Electrical Equipment Maintenance

UNDERWRITERS LABORATORIES (UL)

UL 467 (1993; Rev thru Feb 2001) Grounding and Bonding Equipment

UL 486A (1997; Rev thru May 2001) Wire Connectors and Soldering Lugs for Use with Copper Conductors

UL 510 (1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

UL 514A (1996; Rev thru Nov 2001) Metallic Outlet Boxes

UL 514B (1997; Rev thru Feb 2002) Fittings for Cable and Conduit

UL 6 (2000; Rev thru May 2003) Rigid Metal Conduit

UL 83 (1998; Rev thru Nov 2001) Thermoplastic-Insulated Wires and Cables

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS applies to this section with additions and modifications specified herein.

1.2.1 Underground Service

Terminate underground service into building at a point 5 feet outside the building and projections thereof, except that service conductors shall be continuous to the interior terminating point indicated. Connections of the service to the service switch, panelboard, or load center is included in Section 16402N INTERIOR DISTRIBUTION SYSTEM. Protect ends of underground conduit with threaded metal caps or plastic plugs as applicable until connections are made.

1.3 DEFINITIONS

a. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

b. In the text of this section, "medium voltage cable splices," and "medium voltage cable joints" are used interchangeably and have the same meaning.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Proposed precast sectional underground duct bank; G

SD-03 Product Data

Medium voltage cable; G

Medium voltage cable terminations; G

600 volt wires and cables

SD-06 Test Reports

Acceptance checks and tests; G

Identify each cable for 600-volt, and medium voltage cable tests.

SD-07 Certificates

Cable splicer/terminator; G

Cable splicer qualifications; G

Thirty calendar days before making splices or terminations, submit names of the cable splicers to be employed, together with proof that splicer has at least 3 years experience in splicing the type and rating of cables specified. Submit certification for each splicer by the cable joint kit manufacturer in the use of manufacturer's kits.

SD-08 Manufacturer's Instructions

Ground megger

"UL listed" kit

Termination kit

Medium-voltage joints

SD-09 Manufacturer's Field Reports

Factory engineered heat shrinkable joint kit

1.5 QUALITY ASSURANCE

Each cable splicer may be required to make an approved dummy splice in the presence of the Contracting Officer in accordance with cable manufacturer's instructions. The Contractor shall furnish the material for dummy splices.

1.5.1 Cable Splicer Qualifications

a. In order to establish the cable workman's competency, the Contractor shall be required to submit the following within 30 calendar days prior to commencement of the splice/termination:

(1) Documentation to verify that the individual has completed a splice/termination of the type to be installed under this

contract. The test splice-termination shall be performed at the job site for this contract under the supervision of the cable accessory manufacturer or his representative and witnessed by the Government.

(2) Documentation that said splice/termination has undergone and passed the following tests by the splice-termination manufacturer or an independent testing laboratory.

TEST	Minimum Value 5 kV	15 kV	35 kV
Discharge Ext. Value with 3 pC or less	13 kV	20 kV	35 kV
AC withstand, 1 minute	35 kV	50 kV	75 kV
DC withstand, 15 minutes	65 kV	70 kV	100 kV

These results shall be attached for review

(3) A statement of the number of years in which the individual has been splicing/terminating medium voltage cable.

b. Criteria for waiver: Items a.1 and a.2 above may be waived on subsequent jobs provided the following criteria is satisfied:

(1) Documentation of prior completion of items a.1 and a.2 be submitted.

(2) A list of the last three jobs where the specific splices/terminations were installed within the past 12 consecutive months. The tabulation shall include splice/termination manufacturer, catalog number, and the number of splice/terminations installed.

c. Requalifications: Requalification to items a.1 and a.2 in above paragraph may be required if the splice installer can not demonstrate a prior history of splice/termination installation during the previous 12 consecutive months. The contractor shall furnish the material for splices and terminations.

1.5.2 Test Instrument and Procedure

Submit for use of ground megger with proposed method indicated.

1.5.3 Manufacturer's Test

Submit the manufacturer's test report indicating that performance of the heat shrinkable joint kit is equivalent to the cable rating, in accordance with the applicable sections of IEEE Std 48, IEEE Std 404, and AEIC CS1.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Conduit

2.1.1.1 Rigid Metal Conduit

UL 6, galvanized steel, threaded type.

2.1.1.2 Plastic Conduit for Direct Burial

NEMA TC 2, EPC-40-PVC or EPC-80-PVC as indicated.

2.1.2 Fittings

2.1.2.1 Metal Fittings

UL 514B, threaded type.

2.1.2.2 PVC Conduit Fittings

NEMA TC 3

2.1.2.3 Outlet Boxes for Steel Conduit

Outlet boxes for use with rigid or flexible steel conduit shall be cast-metal cadmium or zinc-coated if of ferrous metal with gasketed closures and shall conform to UL 514A.

2.1.3 Conductors Rated 600 Volts and Less

Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.1.3.1 600 Volt Wires and Cables

Service entrance and direct buried conductors shall conform to UL 854, Type USE. Conductors in conduit other than service entrance shall conform to UL 83, Type THWN. Conductor size and number of conductors in each cable shall be as indicated. Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat shrink type sleeves. Control circuit terminations shall be properly identified. Conductors No. 10 AWG and smaller shall be solid copper. Conductors No. 8 AWG and larger shall be stranded copper. All conductors shall be copper.

a. Colors for coding conductors shall be:

208-VOLT SYSTEM	480-VOLT SYSTEM
Neutral - White	Neutral - White
Phase A - Black	Phase A - Brown

Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Grounding conductor - Green	Grounding conductor - Green

2.1.4 600 Volt Wire Connector and Terminals

Shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on stranded conductors.

a. For use with copper conductors: UL 486A.

2.1.5 600 Volt Splices

Provide splices with a compression connector on the conductor and by insulating and waterproofing using one of the following methods which are suitable for continuous submersion in water and comply ANSI C119.1.

a. Provide cast-type splice insulation by means of molded casting process employing a thermosetting epoxy resin insulating material applied by a gravity poured method or by a pressure injected method. Provide component materials of the resin insulation in a packaged form ready for convenient mixing without removing from the package.

b. Gravity poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare the resin mix and pour into the mold.

c. Provide heavy wall heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which shall be applied by a clean burning propane gas torch.

d. Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as covering or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

2.1.6 Medium Voltage Cable

Cable (conductor) sizes are designated by American Wire Gauge (AWG) and Thousand Circular Mils (Kcmil). Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout cable length. Wires and cables manufactured more than 24 months prior to date of delivery to the site shall not be accepted.

Cable for 15 kV underground distribution system shall be ozone resistant ethylene-propylene-rubber-insulated (EPR) cable conforming to NEMA WC 8, as applicable. Cable shall be single conductor, employing concentric, Class B stranded copper conductors. Cable shall have conductor and insulation shielding. Insulation shielding shall be metal tape type consisting of a concentric serving of tape according to NEMA WC 8. Cable shall be rated 25 kV with insulation and jacket thickness of 345 and 80 mils, respectively.

Cable shall have a polyvinyl chloride jacket.\

2.1.7 Medium Voltage Cable Terminations

IEEE Std 48 Class 1. Provide terminations including stress control terminator, ground clamp, connectors, and lugs. Terminator shall be the product of one manufacturer, suitable for the type and materials of the cable terminated. Furnish components in the form of a "UL listed" kit, including complete instructions which shall be followed for assembly and installation. Provide terminator as specified herein for terminating single conductor, solid insulated, nonmetallic jacketed type cables for service voltage up to 35 KV indoor and outdoor. Do not use separate parts of copper or copper alloy in contact with aluminum alloy parts in the construction or installation of the terminator.

2.1.7.1 Outdoor Terminations

Outdoor terminator shall be cold shrink type or porcelain insulator.

a. Cold-Shrink Type:

Terminator shall be a one-piece design, where high-dielectric constant (capacitive) stress control is integrated within a skirted insulator made of silicone rubber, munsel gray in color. Termination shall not require heat or flame for installation. Termination kit shall contain all necessary materials (except for the lugs). Termination shall be designed for installation in low or highly contaminated indoor and outdoor locations and shall be rated for continuous operation at 90 degree C, with an emergency overload temperature rating of 130 degree C.

b. Porcelain Insulator Type

Terminator shall comply with requirements of IEEE Std 48 Class 1, except that the requirements of design tightness test need not be met. However, the terminator shall not exude any insulating filler compound under either test or service. Terminator shall consist of a porcelain insulator, copper cable connector-hoodnut assembly and copper aerial lug as required, metal body and supporting bracket, sealed cable entrance, internal stress relief device for shielded cable, and insulating filler compound or material.

2.1.7.2 Termination; Separable Insulated Connector Type

Provide as specified in Section 16272N PAD-MOUNTED TRANSFORMERS.

2.1.8 Tape

2.1.8.1 Insulating Tape

UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.

2.1.8.2 Buried Warning and Identification Tape

Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried cable and conduit. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inchesminimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length.

Warning and identification shall be CAUTION BURIED ELECTRIC, TELEPHONE CABLE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.1.9 Pull Rope

Shall be plastic having a minimum tensile strength of 200 pounds. Leave a minimum of 24 inches of slack at each end of the pull wires.

2.1.10 Grounding and Bonding Equipment

UL 467. Ground rods shall be copper clad steel with diameter adequate to permit driving to full length of the rod, but not less than 3/4 inch in diameter and 10 feet long unless otherwise indicated.

2.2 SOURCE QUALITY CONTROL

2.2.1 Medium Voltage Cable Tests

Results of AEIC C5 qualification and production tests as applicable for each type of medium voltage cable.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70 and ANSI C2.

3.1.1 Contractor Damage

The Contractor shall promptly repair any indicated utility lines or systems damaged by Contractor operations. Damage to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the General Provisions of the contract. If the Contractor is advised in writing of the location of a nonindicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In any event, the Contractor shall immediately notify the Contracting Officer of any such damage.

3.1.2 Concrete

Concrete work for electrical requirements shall be 3000 psiminimum ultimate 28-day compressive strength with one inchminimum aggregate conforming to the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

3.1.3 Underground Conduit/Duct Without Concrete Encasement

Type of conduit shall be EPC-80-PVC.

3.1.3.1 Conduit Installation

Top of the conduit shall be not less than 24 inches below grade, and shall have a minimum slope of 3 inches in each 100 feet away from buildings and toward manholes and other necessary drainage points. Run conduit in straight lines except where a change of direction is necessary. As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which,

draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. Provide not less than 3 inches clearance from the conduit to each side of the trench. A minimum clearance of 2 1/2 inches shall be provided between adjacent conduits. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve. Provide color, type and depth of warning tape as specified in Section 02300 EARTHWORK.

3.1.3.2 Encasement Under Roads and Structures

Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks. Conduits to be installed under existing paved areas which are not to be disturbed, and under roads and railroad tracks, shall be zinc-coated, rigid steel, jacked into place.

3.1.3.3 Multiple Conduits

Separate multiple conduits by a minimum distance of 2 1/2 inches, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 3 inches. Stagger the joints of the conduits by rows and layers to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

3.1.4 Underground Duct with Concrete Encasement

Construct underground duct lines of individual conduits encased in concrete. Except where rigid galvanized steel conduit is indicated or specified, the conduit shall be EPC-40-PVC. Do not mix different kinds of conduit in any one duct bank. Ducts shall not be smaller than 4 inches in diameter unless otherwise indicated. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 2 1/2 inches, except separate light and power conduits from control, signal, and telephone conduits by a minimum concrete thickness of 3 inches.

3.1.4.1 Depth of Encasement

Top of the concrete encasement shall not be less than 24 inches below grade.

3.1.4.2 Slope of Encasement

Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 3 inches in 100 feet. Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet; sweep bends

may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3 inches in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.

3.1.4.3 Conduits

Terminate conduits in end-bells where duct lines enter underground structures. Stagger conduit joints by rows and layers to strengthen the duct bank. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in duct bank. Install spacers per manufacture's instructions, but provide a minimum of two spacer assemblies per 10 feet of duct bank. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.

3.1.4.4 Test Mandrel

As each section of a duct line is completed from structure to structure, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the diameter of the conduit through each conduit. After which, draw a stiff bristle brush through the conduit, until conduit is clear of particles of earth, sand, and gravel; then immediately install end plugs.

3.1.4.5 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.1.5 Underground Conduit for Service Feeders Into Buildings

Shall be PVC, Type EPC-80 from the service equipment to a point 5 feet beyond the building and projections thereof. Protect the ends of the conduit by threaded metal caps or bushings; coat the threads with graphite grease or other coating. Clean and plug conduit until conductors are installed. Encase the underground portion of the conduit in a concrete envelope and bury as specified for underground duct with concrete encasement.

3.1.6 Conduit Protection at Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be PVC coated and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.1.7 Buried Warning and Identification Tape

Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

3.1.8 Cable Pulling

Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.1.8.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables. Lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.1.8.2 Cable Pulling Tensions

Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Monitor pulling tension during cable installation to ensure maximum pulling tension is not exceeded.

3.1.8.3 Secondary Cable Runs, 600 Volts and Less

Provide insulated copper equipment grounding conductor, sized as required by the rating of the overcurrent device supplying the phase conductors.

3.1.9 600 Volt Cable Splicing and Terminating

Protect terminations of insulated power and lighting cables from accidental contact, deterioration of coverings and moisture by providing terminating devices and materials. Install terminations of insulated power and lighting cables in accordance with the manufacturer's requirements. Make terminations with materials and methods as indicated or specified herein or as designated by the written instructions of the cable manufacturer and termination kitmanufacturer.

3.1.9.1 Splices for 600 Volt Class Cables

Splices in underground distribution systems shall made only in accessible locations such as manholes and handholes, with a compression connector on the conductor and by insulating and waterproofing by one of the following methods suitable for continuous submersion in water and comply with ANSI C119.1.

a. Provide cast-type splice insulation by means of molded casting process employing a thermosetting epoxy resin insulating material applied by a gravity poured method or by a pressure injected method. Provide component materials of the resin insulation in a packaged form ready for convenient mixing without removing from the package. Do not allow the cables to be moved until after the splicing material has completely set.

b. Gravity poured method shall employ materials and equipment

contained in an approved commercial splicing kit which includes a mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare the resin mix and pour into the mold. Do not allow cables to be moved until after the splicing materials have completely set.

c. Provide heavy wall heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which should be applied by a clean burning propane gas torch. Cables may be moved when joint is cool to the touch.

d. Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as coverings or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

3.1.10 Medium Voltage Cable Terminations

Provide terminating devices and materials to protect medium voltage cable terminations from accidental contact, deterioration of coverings, and moisture. Make terminations by using materials and methods specified herein and as designated by the written instruction of the cable manufacturer and termination kit manufacturer. Termination for high-voltage cables shall be rated, and be capable of withstanding test voltages, in accordance with IEEE Std 48. Terminations of single- and multiconductor cables shall include the securing and sealing of the sheath and insulation of the cable conductors, stress relief and grounding of cable shields of shielded cable, and grounding of neutral conductors, metallic sheaths, and armor. Adequately support cables and cable terminations to avoid any excessive strain on the termination and the conductor connection.

3.1.11 Cable End Caps

Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated. Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

3.1.12 Live End Caps

Provide live end caps for single conductor medium voltage cables where indicated.

3.1.13 Grounding Systems

Noncurrent-carrying metallic parts associated with electrical equipment shall have a maximum resistance to solid earth ground not exceeding the following values:

Pad-mounted transformers without protective fences: 5 ohms

Grounded secondary distribution system neutral and noncurrent-carrying

metal parts associated with distribution systems and grounds not otherwise covered: 5 ohms

When work in addition to that indicated or specified is directed in order to obtain the specified ground resistance, the provisions of the contract covering "Changes" shall apply.

3.1.13.1 Grounding Electrodes

Provide cone pointed driven ground rods driven full depth plus 6 inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded.

3.1.13.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

3.1.13.3 Grounding Conductors

Grounding conductors shall be stranded-bare copper conforming to ASTM B 8, Class B, for sizes No. 6 AWG and larger, and shall be solid-bare copper conforming to ASTM B 1 for sizes No. 8 and smaller. Cable sheaths, cable shields, conduit, and equipment shall be grounded with No. 6 AWG.

3.1.13.4 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.1.14 Special Conditions

During the construction of duct banks and underground structures located in streets, the streets shall remain open to traffic. Plan and execute the work to meet this condition. At locations where duct banks cross railroad tracks and the work requires closing of the tracks, secure permission from the Contracting Officer for each track closure.

3.1.15 Earthwork for Utilities

Section 02300 EARTHWORK.

3.1.16 Reconditioning of Surfaces

3.1.16.1 Unpaved Surfaces

Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding.

3.1.16.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.1.17 Certificate of Competency for Cable Splicer/Terminator

Certification of the qualification of the cable splicer/terminator shall be submitted, for approval, 30 days before splices or terminations are to be made in medium voltage (5 kV to 35 kV) cables. The certification shall include the training, and experience of the individual on the specific type and classification of cable to be provided under this contract. The certification shall indicate that the individual has had three or more years recent experience splicing and terminating medium voltage cables. The certification shall also list a minimum of three splices/terminations that have been in operation for more than one year. In addition, the individual may be required to perform a dummy or practice splice/termination in the presence of the Contracting Officer, before being approved as a qualified cable splicer. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice/termination kit, and detailed manufacturer's instructions for the cable to be spliced. The Contracting Officer reserves the right to require additional proof of competency or to reject the individual and call for certification of an alternate cable splicer.

3.2 FIELD QUALITY CONTROL

As an exception to requirements that may be stated elsewhere in the contract, notify the Contracting Officer 5 working days prior to each tests. Furnish labor, equipment. and incidentals required for testing, except that the Government will provide electric power required for the tests. Correct defects in the work provided by the Contractor and repeat tests until the work is in compliance with contract requirements.

3.2.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, NFPA 70B, NETA ATS, and referenced ANSI standards. Include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.2.1.1 600 Volt Cable Tests

Perform tests after wiring is completed, connected, and ready for operation, but prior to placing system in service and before any branch circuit breaker is closed.

a. Visual and Mechanical Inspection

(1) Inspect cables for physical damage and proper connection in accordance with contract plans and specifications.

(2) Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench. In the absence of manufacturer's data use NETA recommended values.

(3) Check cable color coding for compliance with contract specifications.

b. Electrical Tests

(1) Perform insulation-resistance test on each conductor with respect to ground and adjacent conductor; applied potential shall be 1000 volts DC for 1 minute; minimum insulation-resistance values shall not be less than 2 megohms.

(2) Perform continuity test to insure proper cable connection.

3.2.1.2 Medium Voltage Cables

Perform tests after installation of cable, splices, and terminators and before terminating to equipment.

a. Visual and Mechanical Inspection

(1) Inspect exposed cable sections for physical damage.

(2) Verify that cable is supplied and connected in accordance with contract plans and specifications.

(3) Inspect for proper shield grounding, cable support, and cable termination.

(4) Verify that cable bends are not less than ICEA or manufacturer's minimum allowable bending radius.

(5) Inspect for proper fireproofing.

(6) Visually inspect jacket and insulation condition.

(7) Inspect for proper phase identification and arrangement.

b. Electrical Tests

(1) Perform a shield continuity test on each power cable by ohmmeter method. Record ohmic value, resistance values in excess of 10 ohms per 1000 feet of cable must be investigated and justified.

(2) Perform a DC high-potential test on all cables. Adhere to

precautions and limits as specified in the applicable NEMA/ICEA Standard for the specific cable. Test procedure shall be as follows, and the results for each cable test shall be recorded as specified herein. Field acceptance test voltage for 15 kV cable shall be 65 kV DC with insulated connectors.

(a) Current-sensing circuits in test equipment shall measure only the leakage current associated with the cable under test and shall not include internal leakage of the test equipment.

(b) Record wet- and dry-bulb temperatures or relative humidity and temperature.

(c) Test each section of cable individually.

(d) Individually test each conductor with all other conductors grounded; Ground all shields.

(e) Terminations shall be properly corona-suppressed by guard ring, field reduction sphere, or other suitable methods as necessary.

(f) Ensure that the maximum test voltage does not exceed the limits for terminators specified in IEEE standard 48 or manufacturer's specifications.

(g) Apply the DC high-potential test in at least five equal increments until maximum test voltage is reached. No increment shall exceed the voltage rating of the cable. Record DC leakage current at each step after a constant stabilization time consistent with system charging current.

(h) Raise the conductor to the specified maximum test voltage and hold for fifteen (15) minutes. Record readings of leakage current at 30 seconds and one minute and at one-minute intervals thereafter. Provide a graphic plot of readings with leakage current (X axis) versus voltage (Y axis) at each increment.

(i) Reduce the conductor test potential to zero and measure residual voltage at discrete intervals.

(j) Apply grounds for a time period adequate to drain all insulation stored charge.

(k) When new cables are spliced into existing cables, the DC high-potential test shall be performed on the new cable prior to splicing. After test results are approved for new cable and the splice is completed, an insulation-resistance test and a shield-continuity test shall be performed on the length of new and existing cable including the splice. After a satisfactory insulation-resistance test, a DC high-potential test shall be performed on the completed cable system utilizing a test voltage 75 percent of new cable tested value.

3.2.1.3 Ground Rods

Perform ground resistance tests for ground rods before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Ground resistance shall also be measured for each

piece of equipment and medium voltage cable splice to the ground electrode. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test.

3.2.2 Approval of Test Results

Medium voltage cable test results shall be approved by SOUTHNAVFACENGCOM (Code 074).

-- End of Section --

SECTION 16402N

INTERIOR DISTRIBUTION SYSTEM
09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(2001) Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2003) Acceptance Testing Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C80.1	(1994) Rigid Steel Conduit - Zinc Coated (GRC)
NEMA C80.3	(1994) Electrical Metallic Tubing - Zinc Coated (EMT)
NEMA FU 1	(2002) Low Voltage Cartridge Fuses
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures
NEMA KS 1	(2001) Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
NEMA RN 1	(1998) Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA ST 20	(1992; R 1997) Dry-Type Transformers for General Applications
NEMA TC 2	(2003) Electrical Polyvinyl Chloride (PVC) Tubing (EPT) and Conduit
NEMA TC 3	(1999) PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA WD 1	(1999) General Color Requirements for Wiring Devices
NEMA WD 6	(2002) Wiring Devices - Dimensional

Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(2000) Flexible Metal Conduit
UL 1242	(2000; Rev thru May 2003) Electrical Intermediate Metal Conduit -- Steel
UL 1449	(1996; Rev thru Jul 2002) Transient Voltage Surge Suppressors
UL 198E	(1988; Rev Jul 1988) Class R Fuses
UL 20	(2000; Rev thru Jun 2003) General-Use Snap Switches
UL 360	(1996; Rev thru May 2003) Liquid-Tight Flexible Steel Conduits
UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment
UL 486A	(1997; Rev thru May 2001) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486C	(2000; Rev thru Oct 2002) Splicing Wire Connectors
UL 489	(2002; Rev thru May 2003) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(2001; Rev thru Oct 2002) Attachment Plugs and Receptacles
UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 514B	(1997; Rev thru Feb 2002) Fittings for Cable and Conduit
UL 6	(2000; Rev thru May 2003) Rigid Metal Conduit
UL 651	(1995; Rev thru Oct 2002) Schedule 40 and 80 Rigid PVC Conduit
UL 67	(1993; Rev thru Feb 2003) Panelboards

UL 797	(2000; Rev thru May 2003) Electrical Metallic Tubing -- Steel
UL 83	(1998; Rev thru Nov 2001) Thermoplastic-Insulated Wires and Cables
UL 869A	(1998) Reference Standard for Service Equipment
UL 943	(1993; Rev thru Apr 2002) Ground-Fault Circuit-Interrupters

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Panelboards; G

Transformers; G

SD-03 Product Data

Receptacles; G

Circuit breakers; G

Switches; G

Transformers; G

Enclosed circuit breakers; G

Grounding Block; G

Surge protective devices; G

SD-06 Test Reports

600-volt wiring test; G

Grounding system test; G

Transformer tests; G

Ground-fault receptacle test; G

SD-07 Certificates

Fuses; G

SD-09 Manufacturer's Field Reports

Transformer factory tests

SD-10 Operation and Maintenance Data

Electrical Systems, Data Package 5; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA and as specified herein.

1.4 QUALITY ASSURANCE

1.4.1 Fuses

Submit coordination data as specified in article entitled, "FUSES" of this section.

1.5 MAINTENANCE

1.5.1 Electrical Systems

Submit operation and maintenance manuals for electrical systems that provide basic data relating to the design, operation, and maintenance of the electrical distribution system for the building. This shall include:

a. Single line diagram of the "as-built" building electrical system.

b. Schematic diagram of electrical control system (other than HVAC, covered elsewhere).

c. Manufacturers' operating and maintenance manuals on active electrical equipment.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70.

2.2 CONDUIT AND FITTINGS

Shall conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

NEMA C80.1, UL 6.

2.2.2 Rigid Nonmetallic Conduit

PVC Type EPC-40, and EPC-80 in accordance with NEMA TC 2,UL 651, or fiberglass conduit, in accordance with NEMA TC 14.

2.2.3 Intermediate Metal Conduit (IMC)

UL 1242, zinc-coated steel only.

2.2.4 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797, NEMA C80.3.

2.2.5 Plastic-Coated Rigid Steel and IMC Conduit

NEMA RN 1, Type 40 (40 mils thick).

2.2.6 Flexible Metal Conduit

UL 1.

2.2.6.1 Liquid-Tight Flexible Metal Conduit, Steel

UL 360.

2.2.7 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B.

2.2.7.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

2.2.7.2 Fittings for EMT

Steel compression type.

2.2.8 Fittings for Rigid Nonmetallic Conduit

NEMA TC 3, UL 514B.

2.2.9 Liquid-Tight Flexible Nonmetallic Conduit

UL 1660.

2.3 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.4 WIRES AND CABLES

Wires and cables shall meet applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

2.4.1 Conductors

Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and

ampacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.

2.4.1.1 Minimum Conductor Sizes

Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG; and for Class 3 low-energy, remote-control, alarm and signal circuits, No. 22 AWG.

2.4.2 Color Coding

Provide for service, feeder, branch, control, and signaling circuit conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutral shall be white with colored (not green) stripe. Color of ungrounded conductors in different voltage systems shall be as follows:

a. 208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

b. 480/277 volt, three-phase

(1) Phase A - brown

(2) Phase B - orange

(3) Phase C - yellow

c. 120/240 volt, single phase: Black and red

2.4.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN/THHN conforming to UL 83 except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.4.4 Bonding Conductors

ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.5 SPLICES AND TERMINATION COMPONENTS

UL 486A for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires shall be insulated, pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.6 DEVICE PLATES

Provide UL listed, one-piece device plates for outlets to suit the devices installed. For metal outlet boxes, plates on unfinished walls shall be of zinc-coated sheet steel or cast metal having round or beveled edges. For nonmetallic boxes and fittings, other suitable plates may be provided. Plates on finished walls shall be satin finish stainless steel or brushed-finish aluminum, minimum 0.03 inch thick. Screws shall be machine-type with countersunk heads in color to match finish of plate. Sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed and UL listed for "wet locations."

2.7 SWITCHES

2.7.1 Toggle Switches

NEMA WD 1, UL 20, single pole, three-way and four-way, totally enclosed with bodies of thermoplastic and/or thermoset plastic and mounting strap with grounding screw. Handles shall be brown thermoplastic. Wiring terminals shall be screw-type, side-wired. Contacts shall be silver-cadmium and contact arm shall be one-piece copper alloy. Switches shall be rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

2.7.2 Switch with Red Pilot Handle

NEMA WD 1. Provide pilot lights that are integrally constructed as a part of the switch's handle. The pilot light shall be red and shall illuminate whenever the switch is closed or "on". The pilot lighted switch shall be rated 20 amps and 120 volts or 277 volts as indicated. Provide the circuit's neutral conductor to each switch with a pilot light.

2.7.3 Disconnect Switches

NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Fused switches shall utilize Class R fuseholders and fuses, unless indicated otherwise. Switches serving as motor-disconnect means shall be horsepower rated. Provide switches in NEMA, enclosure as indicated per NEMA ICS 6.

2.7.4 Breakers Used as Switches

For 120- and 277-Volt fluorescent fixtures, mark breakers "SWD" in accordance with UL 489.

2.8 RECEPTACLES

UL 498, hard use, heavy-duty, grounding-type. Ratings and configurations shall be as indicated. Bodies shall be of brown as per NEMA WD 1. Face and body shall be thermoplastic supported on a metal mounting strap. Dimensional requirements shall be per NEMA WD 6. Provide screw-type, side-wired wiring terminals. Connect grounding pole to mounting strap. The receptacle shall contain triple-wipe power contacts and double or triple-wipe ground contacts.

2.8.1 Switched Duplex Receptacles

Provide separate terminals for each ungrounded pole. Top receptacle shall

be switched when installed.

2.8.2 Weatherproof Receptacles

Provide in cast metal box with gasketed, weatherproof, cast-metal cover plate and gasketed cap over each receptacle opening. Provide caps with a spring-hinged flap. Receptacle shall be UL listed for use in "wet locations with plug in use."

2.8.3 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Device shall be capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A GFCI devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.8.4 Plugs

Provide heavy-duty, rubber-covered three-wire cord of required size, install plugs thereon, and attach to equipment. Plugs shall be UL listed with receptacles, complete with grounding blades. Where equipment is not available, turn over plugs and cord assemblies to the Government.

2.9 PANELBOARDS

UL 67 and UL 50 having a short-circuit current rating as indicated. Panelboards for use as service disconnecting means shall additionally conform to UL 869A. Panelboards shall be circuit breaker-equipped. Design shall be such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL. "Specific breaker placement" is required in panelboards to match the breaker placement indicated in the panelboard schedule on the drawings. Use of "Subfeed Breakers" is not acceptable unless specifically indicated otherwise. Main breaker shall be "separately" mounted "above" or "below" branch breakers. Where "space only" is indicated, make provisions for future installation of breakers. Panelboard locks shall be keyed same. Directories shall indicate load served by each circuit in panelboard. Directories shall also indicate source of service to panelboard (e.g., Panel PA served from Panel MDP). Type directories and mount in holder behind transparent protective covering.

2.9.1 Panelboard Buses

Support bus bars on bases independent of circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet.

2.9.2 Circuit Breakers

UL 489, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker shall be mounted. Breaker terminals shall be UL listed as suitable for type of conductor provided. Series rated circuit breakers and plug-in circuit breakers without a self-contained bracket and not secured by a positive locking device requiring mechanical release for

removal are unacceptable.

2.9.2.1 Multipole Breakers

Provide common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

2.9.2.2 Circuit Breaker With GFCI

UL 943 and NFPA 70. Provide with "push-to-test" button, visible indication of tripped condition, and ability to detect and trip on current imbalance of 6 milliamperes or greater per requirements of UL 943 for Class A GFCI devices, for personnel protection, and 20 milliamperes or greater per requirements of UL 943 for Class B GFCI per equipment protection.

2.9.2.3 Circuit Breakers for HVAC Equipment

Circuit breakers for HVAC equipment having motors (group or individual) shall be marked for use with HACR type and UL listed as HACR type.

2.10 ENCLOSED CIRCUIT BREAKERS

UL 489. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type as indicated. Provide solid neutral.

2.11 FUSES

NEMA FU 1. Provide complete set of fuses for each fusible switch. Time-current characteristics curves of fuses serving motors or connected in series with circuit breakers shall be coordinated for proper operation. Submit coordination data for approval. Fuses shall have voltage rating not less than circuit voltage.

2.11.1 Cartridge Fuses, Current Limiting Type (Class R)

UL 198E, Class RK-5 time-delay type. Associated fuseholders shall be Class R only.

2.12 TRANSFORMERS

NEMA ST 20, general purpose, dry-type, self-cooled, ventilated. Provide transformers in NEMA 2 enclosure. Transformer shall have 220 degrees C insulation system for transformers 15 kVA and greater, and shall have 180 degrees C insulation for transformers rated 10 kVA and less, with temperature rise not exceeding 150 degrees C under full-rated load in maximum ambient of 40 degrees C.

2.13 TELEPHONE SYSTEM

Provide system of telephone wire-supporting structures, including: conduits with pull wires terminal boxes, outlet and junction boxes, other accessories for telephone outlets, and backboards. Additional requirements are in Section 16710N STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM.

2.13.1 Outlet Boxes for Telephone System

Standard type, as specified herein, 4 by 4 in. Mount flush in finished walls at height specified for outlet receptacles. Outlet boxes for wall-mounted telephones shall be 2 by 4 by 2 1/8 in deep; mounted at height 48 in above finished floor.

2.13.2 Cover Plates

Modular telephone type with same finish specified for receptacle and switch cover plates.

2.13.3 Conduit Sizing

Conduit for single outlets shall be minimum of 3/4 in and for multiple outlets minimum of one inch. Size conduits for telephone risers to telephone cabinets, junction boxes, distribution centers, and telephone service, as indicated.

2.13.4 Backboards

Interior grade plywood, 3/4 in thick, size as indicated. Paint with gray fire resistant paint.

2.13.5 Receptacles for Telephone Service

Provide receptacle, 125 volts, 20 amperes, single phase, 60 Hz, adjacent to telephone backboards, served from dedicated panelboard circuit.

2.14 GROUNDING AND BONDING EQUIPMENT

UL 467. Ground rods shall be sectional type, copper-clad steel, with minimum diameter of 3/4 in and minimum length of 10 ft.

2.15 NAMEPLATES

Provide as specified in Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS.

2.16 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations in accordance with Section 07840 FIRESTOPPING.

2.17 SURGE PROTECTIVE DEVICES

Provide parallel type surge protective devices which comply with UL 1449 at the service entrance and panelboards. Provide surge protectors in a NEMA 1 enclosure per NEMA ICS 6. Provide the following modes of protection:

FOR SINGLE PHASE AND THREE PHASE WYE CONNECTED SYSTEMS-
Each phase to neutral (L-N)
Neutral to ground (N-G)
Phase to ground (L-G)

Surge protective devices at the service entrance shall have a minimum surge current rating of 80,000 amperes per mode minimum. The maximum line to neutral (L-N) Suppressed Voltage Rating (SRV) shall be:

900V for 480Y/277V, three phase system

The minimum MCOV (Maximum Continuous Operating Voltage) rating shall be:

600/320V for 480Y/277V, three phase system

EMI/RFI filtering shall be provided for each mode with the capability to attenuate high frequency noise. Minimum attenuation shall be 20db.

2.18 SOURCE QUALITY CONTROL

2.18.1 Transformer Factory Tests

Submittal shall include routine NEMA ST 20 transformer test results on each transformer and also contain the results of NEMA "design" and "prototype" tests that were made on transformers electrically and mechanically equal to those specified.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.

3.1.1 Underground Service

Underground service conductors and associated conduit shall be continuous from service entrance equipment to outdoor power system connection.

3.1.2 Service Entrance Identification

Service entrance disconnect devices, switches, and enclosures shall be labeled and identified as such.

3.1.2.1 Labels

Wherever work results in service entrance disconnect devices in more than one enclosure, as permitted by NFPA 70, each enclosure, new and existing, shall be labeled as one of several enclosures containing service entrance disconnect devices. Label, at minimum, shall indicate number of service disconnect devices housed by enclosure and shall indicate total number of enclosures that contain service disconnect devices. Provide laminated plastic labels conforming to paragraph entitled "Nameplates." Use lettering of at least 0.25 in in height, and engrave on black-on-white matte finish. Service entrance disconnect devices in more than one enclosure, shall be provided only as permitted by NFPA 70.

3.1.3 Wiring Methods

Provide insulated conductors installed in rigid steel conduit, IMC, rigid nonmetallic conduit, or EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor shall be separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size shall be 1/2 in in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings shall be made with metal conduit in fire-rated shafts. Metal conduit shall extend through shafts for minimum distance of 6 in. Conduit which penetrates fire-rated walls,

fire-rated partitions, or fire-rated floors shall be firestopped in accordance with Section 07840 FIRESTOPPING.

3.1.3.1 Restrictions Applicable to EMT

a. Do not install underground.

b. Do not encase in concrete, mortar, grout, or other cementitious materials.

c. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.

d. Do not use in hazardous areas.

e. Do not use outdoors.

f. Do not use in fire pump rooms.

3.1.3.2 Restrictions Applicable to Nonmetallic Conduit

a. PVC Schedule 40 and PVC Schedule 80

(1) Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.

(2) Do not use in hazardous (classified) areas.

(3) Do not use in fire pump rooms.

(4) Do not use in penetrating fire-rated walls or partitions, or fire-rated floors.

(5) Do not use above grade, except where allowed in this section for rising through floor slab or indicated otherwise.

3.1.3.3 Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph entitled "Flexible Connections."

3.1.3.4 Service Entrance Conduit, Underground

PVC, Type-EPC 80, galvanized rigid steel or steel IMC. Underground portion shall be installed minimum 36 in below slab or grade.

3.1.3.5 Underground Conduit Other Than Service Entrance

Plastic-coated rigid steel; plastic-coated steel IMC; PVC, Type EPC-40. Plastic coating shall extend minimum 6 in above floor.

3.1.3.6 Conduit in Floor Slabs

Rigid steel; steel IMC; Type EPC-40.

3.1.4 Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 in away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project. Run conduits under floor slab as if exposed.

3.1.4.1 Conduit Installed Under Floor Slabs

Conduit run under floor slab shall be located a minimum of 12 in below the vapor barrier. Seal around conduits at penetrations thru vapor barrier.

3.1.4.2 Conduit Through Floor Slabs

Where conduits rise through floor slabs, curved portion of bends shall not be visible above finished slab.

3.1.4.3 Conduit Support

Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration resistant and shock-resistant. Holes cut to depth of more than 1 1/2 in in reinforced concrete beams or to depth of more than 3/4 in in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For conduits greater than 2 1/2 in inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

3.1.4.4 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.4.5 Pull Wire

Install pull wires in empty conduits. Pull wire shall be plastic having minimum 200-lb tensile strength. Leave minimum 36 in of slack at each end of pull wire.

3.1.4.6 Telephone and Signal System Conduits

Refer to Section 16710N STRUCTURED TELECOMMUNICAITONS CABLING AND PATHWAY SYSTEM.

3.1.4.7 Conduit Installed in Concrete Floor Slabs

Locate so as not to adversely affect structural strength of slabs. Install conduit within middle one-third of concrete slab. Do not stack conduits. Space conduits horizontally not closer than three diameters, except at cabinet locations. Curved portions of bends shall not be visible above finish slab. Increase slab thickness as necessary to provide minimum one inch cover over conduit. Where embedded conduits cross building and/or expansion joints, provide suitable watertight expansion/deflection fittings and bonding jumpers. Expansion/deflection fittings shall allow horizontal and vertical movement of raceway. Conduit larger than one inch trade size shall be parallel with or at right angles to main reinforcement; when at right angles to reinforcement, conduit shall be close to one of supports of slab. Where nonmetallic conduit is used, raceway shall be converted to plastic coated rigid steel or plastic coated steel IMC before rising above floor, unless specifically indicated.

3.1.4.8 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.4.9 Stub-Ups

Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 in above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.

3.1.4.10 Flexible Connections

Provide flexible steel conduit between 3 and 6 ft in length for recessed and semirecessed lighting fixtures. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size shall be 1/2 in diameter. Provide liquidtight flexible conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

3.1.5 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes

for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, when surface mounted on interior walls exposed up to 7 ft above floors and walkways, and when specifically indicated. Boxes in other locations shall be sheet steel, except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit system. Each box shall have volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures shall be minimum 4 in square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; fixtures shall be readily removable for access to boxes unless ceiling access panels are provided. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 in from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

3.1.5.1 Boxes

Boxes for use with raceway systems shall be minimum 1 1/2 in deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets shall be minimum 4 in square, except that 4 by 2 in boxes may be used where only one raceway enters outlet. Telephone outlets shall be minimum of 4 in square by 2 1/8 in deep, except for wall mounted telephones.

3.1.5.2 Pull Boxes

Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, and compatible with nonmetallic raceway systems, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

3.1.5.3 Extension Rings

Extension rings are not permitted for new construction. Use only on existing boxes in concealed conduit systems where wall is furred out for new finish.

3.1.6 Mounting Heights

Mount panelboards, enclosed circuit breakers, and disconnecting switches so height of operating handle at its highest position is maximum 78 in above floor. Mount lighting switches 48 in above finished floor, receptacles 18 in above finished floor unless otherwise indicated, and other devices as indicated.

3.1.7 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, color coding shall be by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, color coding shall be by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations in accordance with manufacturer's recommendations.

3.1.8 Splices

Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

3.1.9 Covers and Device Plates

Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 in. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

3.1.10 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated walls, partitions, floors, or ceilings in accordance with Section 07840 FIRESTOPPING.

3.1.11 Grounding and Bonding

In accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, telephone system grounds, and neutral conductor of wiring systems. Make ground connection at main service equipment, and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Make ground connection to driven ground rods on exterior of building. Interconnect all grounding media in or on the structure to provide a common ground potential. This shall include electrical service, telephone system grounds, as well as underground metallic piping systems. Interconnection to the gas line shall be made on the customer's side of the meter. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.11.1 Resistance

Maximum resistance-to-ground of grounding system shall not exceed 5 ohms under dry conditions. Where resistance obtained exceeds 5 ohms, contact Contracting Officer for further instructions.

3.1.11.2 Telephone Service

Provide main telephone service equipment ground consisting of separate ground wire, No. 6 AWG in conduit between equipment backboard and readily accessible grounding connection. Equipment end of ground wire shall consist of coiled length at least twice as long as terminal cabinet or backboard height.

3.1.12 Equipment Connections

Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications but shall be provided under the section specifying the associated equipment.

3.1.13 Government-Furnished Equipment

Contractor shall make connections to Government-furnished equipment to make equipment operate as intended, including providing miscellaneous items such as plugs, receptacles, wire, cable, conduit, flexible conduit, and outlet boxes or fittings.

3.1.14 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

3.1.15 Surge Protective Devices

Connect the surge protective devices in parallel to the power source, keeping the conductors as short and straight as practically possible.

3.2 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days notice prior to each tests.

3.2.1 Devices Subject to Manual Operation

Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.

3.2.2 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance shall be 250,000 ohms.

3.2.3 Transformer Tests

Perform the standard, not optional, tests in accordance with the Inspection

and Test Procedures for transformers, dry type, air-cooled, 600 volt and below; as specified in NETA ATS. Measure primary and secondary voltages for proper tap settings. Tests need not be performed by a recognized independent testing firm or independent electrical consulting firm.

3.2.4 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed.

3.2.5 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

-- End of Section --

SECTION 16510N

INTERIOR LIGHTING
08/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA HB-9	(2000) Lighting Handbook

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41	(1991) Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C78.42	(2001) Guidelines for High-Pressure Sodium Lamps
NEMA C78.81	(2001) Electric Lamps - Double-capped Fluorescent Lamps Dimensional and Electrical Characteristics
NEMA C82.11	(2002) High-Frequency Fluorescent Lamp Ballasts
NEMA C82.4	(2002) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
NEMA ICS 2	(2000) Industrial Controls and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1029	(1994; Rev thru Feb 2001) High-Intensity-Discharge Lamp Ballasts
UL 1598	(2000) Luminaires
UL 773	(1995; Rev thru Mar 2002) Plug-In Locking Type Photocontrols for Use with Area

	Lighting
UL 773A	(1995; Rev thru Oct 1999) Nonindustrial Photoelectric Switches for Lighting Control
UL 935	(2001) Fluorescent-Lamp Ballasts

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein. Materials not considered to be lighting equipment or lighting fixture accessories are specified in Section 16402N INTERIOR DISTRIBUTION SYSTEM. Lighting fixtures and accessories mounted on exterior surfaces of buildings are specified in this section.

1.3 DEFINITIONS

1.3.1 Average Life

Time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

1.3.2 Total Harmonic Distortion (THD)

The root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Data, drawings, and reports shall employ the terminology, classifications, and methods prescribed by the IESNA HB-9, as applicable, for the lighting system specified.

SD-03 Product Data

Fluorescent lighting fixtures; G

Fluorescent electronic ballasts; G

Fluorescent lamps; G

High-intensity-discharge (HID) lighting fixtures; G

HID ballasts; G

High-pressure sodium (HPS) lamps; G

Lighting contactor; G

Time switch; G

Photocell switch; G

SD-04 Samples

Lighting fixtures, complete with lamps and ballasts; G

SD-06 Test Reports

Operating test

Submit test results as stated in paragraph entitled "Field Quality Control."

SD-10 Operation and Maintenance Data

Lighting Control System, Data Package 5; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA and as specified herein, showing all control modules, control zones, occupancy sensors, light fixtures, and all interconnecting control wire, conduit, and associated hardware.

1.5 QUALITY ASSURANCE

1.5.1 Fluorescent Electronic Ballasts

Submit ballast catalog data as required in the paragraph entitled "Fluorescent Lamp Electronic Ballasts" contained herein. As an option, submit the fluorescent fixture manufacturer's electronic ballast specification information in lieu of the actual ballast manufacturer's catalog data. This information shall include published specifications and sketches, which covers the information required by the paragraph entitled "Fluorescent Lamp Electronic Ballasts" herein. This information may be supplemented by catalog data if required, and shall contain a list of vendors with vendor part numbers.

1.5.2 Lighting Fixtures, Complete With Lamps and Ballasts

Submit one sample of each fixture type and large order item for inspection, review, and approval. The sample shall be retained for comparison against the remainder of the fixtures. The sample may be used in the final fixture installation.

1.5.3 Lighting Control System

Submit operation and maintenance manuals for lighting control systems that provide basic data relating to the design, operation, and maintenance of the lighting control system for the building. This shall include:

a. Schematic diagram of the lighting control system.

b. Manufacturers' operating and maintenance manuals on active lighting control equipment. Lighting control equipment shall include, if indicated: occupancy sensors, power packs, dimming ballasts, and light level sensors.

1.6 ELECTRONIC BALLAST WARRANTY

Furnish the electronic ballast manufacturer's warranty. The warranty period shall not be less than 5 years from the date of manufacture of the electronic ballast. Ballast assembly in the lighting fixture,

transportation, and on-site storage shall not exceed 12 months, thereby permitting 4 years of the ballast 5 year warranty to be in service and energized. The warranty shall state that the malfunctioning ballast shall be exchanged by the manufacturer and promptly shipped to the using Government facility. The replacement ballast shall be identical to, or an improvement upon, the original design of the malfunctioning ballast.

PART 2 PRODUCTS

2.1 FLUORESCENT LIGHTING FIXTURES

UL 1598. Fluorescent fixtures shall have electronic ballasts unless specifically indicated otherwise.

2.1.1 Fluorescent Lamp Electronic Ballasts

The electronic ballast shall as a minimum meet the following characteristics:

a. Ballast shall comply with UL 935, NEMA C82.11, and NFPA 70 unless specified otherwise. Ballast shall provide transient immunity as recommended by IEEE C62.41. Ballast shall be designed for the wattage of the lamps used in the indicated application. Ballasts shall be designed to operate on the voltage system to which they are connected.

b. Power factor shall be 0.95 (minimum).

c. Ballast shall operate at a frequency of 20,000 Hertz (minimum). Ballast shall be compatible with and not cause interference with the operation of occupancy sensors or other infrared control systems. Provide ballasts operating at or above 40,000 Hertz where available.

d. Ballast shall have light regulation of plus or minus 10 percent lumen output with a plus or minus 10 percent input voltage regulation. Ballast shall have 10 percent flicker (maximum) using any compatible lamp.

e. Ballast shall be UL listed Class P with a sound rating of "A."

f. Ballast shall have circuit diagrams and lamp connections displayed on the ballast.

g. Ballasts shall be instant start unless otherwise indicated. Ballasts shall be programmed start where indicated. Instant start ballasts shall operate lamps in a parallel circuit configuration that permits the operation of remaining lamps if one or more lamps fail or are removed. Programmed start ballasts may operate lamps in a series circuit configuration. Provide series/parallel wiring for programmed start ballasts where available.

h. Ballasts for compact fluorescent fixtures shall be programmed start.

i. Ballasts for T-5 and smaller lamps shall have end-of-life protection circuits as required by NEMA C78.81 and NEMA C78.901 as applicable.

j. Ballast shall be capable of starting and maintaining operation at a minimum of 0 degrees F unless otherwise indicated.

k. Electronic ballast shall have a full replacement warranty of 5 years

from date of manufacture as specified in paragraph entitled "Electronic Ballast Warranty" herein.

2.1.1.1 T-8 Lamp Ballast

a. Total harmonic distortion (THD): Shall be 20 percent (maximum).

b. Input wattage.

1. 32 watts (maximum) when operating one F32T8 lamp

2. 62 watts (maximum) when operating two F32T8 lamps

2.1.2 Fluorescent Lamps

a. T-8 rapid start lamps shall be rated 32 watts (maximum), 2800 initial lumens (minimum), CRI of 75 (minimum), color temperature of 3500 K, and an average rated life of 20,000 hours.

2.1.3 Open-Tube Fluorescent Fixtures

Provide with self-locking sockets, or lamp retainers (two per lamp).

2.2 HIGH-INTENSITY-DISCHARGE (HID) LIGHTING FIXTURES

UL 1598.

2.2.1 HID Ballasts

UL 1029 and NEMA C82.4 and shall be constant wattage autotransformer (CWA) or regulator, high power factor type. Provide single-lamp ballasts which shall have a minimum starting temperature of minus 30 degrees C. Ballasts shall be:

a. Designed to operate on the voltage system to which they are connected.

b. Designed for installation in a normal ambient temperature of 40 degrees C.

c. Constructed so that open circuit operation will not reduce the average life.

High-pressure sodium (HPS) ballasts shall have a solid-state igniter/starter with an average life in the pulsing mode of 3500 hours at the intended ambient temperature. Igniter case temperature shall not exceed 90 degrees C in any mode.

2.2.2 High-Pressure Sodium (HPS) Lamps

NEMA C78.42 wattage as indicated. 150 watt lamps, if required, shall be 55 volt type.

2.3 RECESS- AND FLUSH-MOUNTED FIXTURES

Provide type that can be relamped from the bottom. Access to ballast shall be from the bottom. Trim for the exposed surface of flush-mounted fixtures shall be as indicated.

2.4 SUSPENDED FIXTURES

Provide hangers capable of supporting twice the combined weight of fixtures supported by hangers. Provide with swivel hangers to ensure a plumb installation. Hangers shall be cadmium-plated steel with a swivel-ball tapped for the conduit size indicated. Hangers shall allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer provided in shops or hangers to limit swinging. Single-unit suspended fluorescent fixtures shall have twin-stem hangers. Multiple-unit or continuous row fluorescent fixtures shall have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Rods shall be a minimum 0.18 inch diameter.

2.5 LIGHTING CONTACTOR

NEMA ICS 2, mechanically held contactor. Contacts shall be rated 277 volts, 20 amperes, and 6 poles. Coils shall be rated 277 volts. Provide in NEMA 3R enclosure conforming to NEMA ICS 6. Contactor shall have silver alloy double-break contacts and coil clearing contacts for mechanically held contactor.

2.6 TIME SWITCH

Astronomic dial type or electronic type, arranged to turn "ON" at sunset and turn "OFF" at predetermined time between 8:30 p.m. and 2:30 a.m. or sunrise, automatically changing the settings each day in accordance with seasonal changes of sunset and sunrise. Provide switch rated 277 volts, having automatically wound spring mechanism or capacitor, to maintain accurate time for a minimum of 15 hours following power failure. Provide time switch with a manual on-off bypass switch. Housing for the time switch shall be surface-mounted, NEMA 3 enclosure conforming to NEMA ICS 6.

2.7 PHOTOCELL SWITCH

UL 773 or UL 773A, hermetically sealed cadmium-sulfide or silicon diode type cell rated 120 volts ac, 60 Hz with single-throw contacts. Switch shall turn on at or below 3 footcandles and off at 2 to 10 footcandles. A time delay shall prevent accidental switching from transient light sources. Provide switch:

a. In a cast weatherproof aluminum housing with adjustable window slide, rated 1800 VA, minimum.

2.8 EMERGENCY LIGHTING EQUIPMENT

2.8.1 Fluorescent Emergency System

Each system shall consist of an automatic power failure device, test switch operable from outside of the fixture, pilot light visible from outside the fixture, and fully automatic solid-state charger in a self-contained power pack. Charger shall be either trickle, float, constant current or constant potential type, or a combination of these. Battery shall be sealed electrolyte type with capacity as required to supply power to 1 lamp for 90 minutes at a minimum of 1100 lumens per lamp output. Battery shall operate unattended and require no maintenance, including no additional water, for a period of not less than 5 years. Emergency ballasts provided with fixtures containing solid-state ballasts shall be fully compatible with the solid-state ballasts.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Lamps installed and used for working light during construction shall be replaced prior to turnover to the Government if more than 15 percent of their rated life has been used. Lamps shall be tested for proper operation prior to turn-over and shall be replaced if necessary with new lamps from the original manufacturer. Provide 10 percent spare lamps of each type from the original manufacturer.

3.1.2 Lighting Fixtures

Set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved drawings. Installation shall meet requirements of NFPA 70. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed. Recessed and semi-recessed fixtures shall be independently supported from the building structure by a minimum of four wires per fixture and located near each corner of each fixture. Ceiling grid clips are not allowed as an alternative to independently supported light fixtures. Round fixtures or fixtures smaller in size than the ceiling grid shall be independently supported from the building structure by a minimum of four wires per fixture spaced approximately equidistant around the fixture. Do not support fixtures by ceiling acoustical panels. Where fixtures of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support such fixtures independently and provide at least two 3/4 inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the fixture. Provide wires for lighting fixture support in this section. Lighting fixtures installed in suspended ceilings shall also comply with the requirements of Section 09510 ACOUSTICAL CEILINGS.

3.1.3 Suspended Fixtures

Suspended fixtures shall be provided with 45 degree swivel hangers so that they hang plumb and shall be located with no obstructions within the 45 degree range in all directions. The stem, canopy and fixture shall be capable of 45 degree swing. Pendants, rods, or chains 4 feet or longer excluding fixture shall be braced to prevent swaying using three cables at 120 degree separation. Suspended fixtures in continuous rows shall have internal wireway systems for end to end wiring and shall be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces. Aligning splines shall be used on extruded aluminum fixtures to assure hairline joints. Steel fixtures shall be supported to prevent "oil-canning" effects. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown. Maximum distance between

suspension points shall be 10 feet or as recommended by the manufacturer, whichever is less.

3.1.4 Photocell Switch Aiming

Aim switch according to manufacturer's recommendations. Set adjustable window slide for 0.5 footcandles photocell turn-on.

3.2 FIELD QUALITY CONTROL

Upon completion of installation, conduct an operating test to show that equipment operates in accordance with requirements of this section.

-- End of Section --

SECTION 16520N

EXTERIOR LIGHTING
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA HB-9	(2000) Lighting Handbook

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C78.42	(2001) Guidelines for High-Pressure Sodium Lamps
NEMA C82.4	(2002) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1029	(1994; Rev thru Feb 2001) High-Intensity-Discharge Lamp Ballasts
UL 1598	(2000) Luminaires

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, applies to this section, with the additions and modifications specified herein.

1.3 DEFINITIONS

1.3.1 Average Life

Time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

1.3.2 Groundline Section

That portion between one foot above and 2 feet below the groundline.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Luminaire drawings; G

Poles; G

SD-03 Product Data

Luminaires; G

Lamps; G

Ballasts; G

Steel poles; G

SD-06 Test Reports

Test Data for luminaires; G

Operating test

Submit operating test results as stated in paragraph entitled "Field Quality Control."

1.5 QUALITY ASSURANCE

1.5.1 Drawing Requirements

1.5.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and candlepower distribution data shall accompany shop drawings.

1.5.1.2 Poles

Include dimensions, wind load determined in accordance with AASHTO LTS-4, pole deflection, pole class, and other applicable information.

1.5.2 Test Data for Luminaires

a. Distribution data according to IESNA classification type as defined in IESNA HB-9.

b. Computerized horizontal illumination levels in footcandles at ground level, taken every 10 feet. Include average maintained footcandle level and maximum and minimum ratio.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Steel Poles

Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be lighting equipment or lighting fixture accessories are specified in Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION and Section 16402N INTERIOR DISTRIBUTION SYSTEM. Lighting fixtures and accessories mounted on exterior surfaces of buildings are specified in Section 16510N INTERIOR LIGHTING.

2.2 LUMINAIRES

UL 1598. Provide luminaires as indicated. Provide luminaires complete with lamps of number, type, and wattage indicated. Details, shapes, and dimensions are indicative of the general type desired, but are not intended to restrict selection to luminaires of a particular manufacturer. Luminaires of similar designs, light distribution and brightness characteristics, and of equal finish and quality will be acceptable as approved.

2.2.1 Lamps

2.2.1.1 High-Pressure Sodium (HPS) Lamps

NEMA C78.42. Wattage as indicated. HPS lamps shall have average rated life of 16,000 hours (minimum) for 35 watt lamps and 24,000 hours (minimum) for all higher wattage lamps. 150 watt lamps, if required, shall be 55 volt lamps.

2.2.2 Ballasts for High-Intensity-Discharge (HID) Luminaires

UL 1029 and NEMA C82.4, and shall be constant wattage autotransformer (CWA) or regulator, high power-factor type. Provide single-lamp ballasts which shall have a minimum starting temperature of minus 30 degrees C. Ballasts shall be:

a. Designed to operate on voltage system to which they are connected.

b. Constructed so that open circuit operation will not reduce the average life.

HID ballasts shall have a solid-state igniter/starter with an average life

in the pulsing mode of 10,000 hours at the intended ambient temperature. Igniter case temperature shall not exceed 90 degrees C.

2.3 POLES

Provide poles designed for wind loading of 100 miles per hour determined in accordance with AASHTO LTS-4 while supporting luminaires having effective projected areas indicated. Poles shall be anchor-base type designed for use with underground supply conductors. Poles shall have oval-shaped handhole having a minimum clear opening of 2.5 by 5 inches. Handhole cover shall be secured by stainless steel captive screws. Metal poles shall have an internal grounding connection accessible from the handhole near the bottom of each pole. Scratched, stained, chipped, or dented poles shall not be installed.

2.3.1 Steel Poles

AASHTO LTS-4. Provide steel poles having minimum 11-gage steel with minimum yield/strength of 48,000 psi and hot-dipped galvanized in accordance with ASTM A 123/A 123M factory finish. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Pole shall be anchor bolt mounted type. Poles shall have tapered tubular members, either round in cross section or polygonal. Pole shafts shall be one piece. Poles shall be welded construction with no bolts, rivets, or other means of fastening except as specifically approved. Pole markings shall be approximately 3 to 4 feet above grade and shall include manufacturer, year of manufacture, top and bottom diameters, length, and a loading tree. Base covers for steel poles shall be structural quality hot-rolled carbon steel plate having a minimum yield of 36,000 psi.

2.4 BRACKETS AND SUPPORTS

IEEE C136.3, IEEE C136.13, and IEEE C136.21, as applicable. Pole brackets shall be not less than 1 1/4 inch galvanized steel pipe secured to pole. Slip-fitter or pipe-threaded brackets may be used, but brackets shall be coordinated to luminaires provided, and brackets for use with one type of luminaire shall be identical. Brackets for pole-mounted street lights shall correctly position luminaire no lower than mounting height indicated. Mount brackets not less than 24 feet above street. Special mountings or brackets shall be as indicated and shall be of metal which will not promote galvanic reaction with luminaire head.

2.5 POLE FOUNDATIONS

Anchor bolts shall be steel rod having a minimum yield strength of 50,000 psi; the top 12 inches of the rod shall be galvanized in accordance with ASTM A 153/A 153M. Concrete shall be as specified in Section 03300N CAST-IN-PLACE CONCRETE.

PART 3 EXECUTION

3.1 INSTALLATION OF POLES

IEEE C2, NFPA 70, and to the requirements specified herein.

3.1.1 Steel

Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide galvanized

nuts, washers, and ornamental covers for anchor bolts. Concrete for anchor bases, polyvinyl chloride (PVC) conduit ells, and ground rods shall be as specified in Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.

3.2 GROUNDING

Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.3 FIELD QUALITY CONTROL

Upon completion of installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this section.

-- End of Section --

SECTION 16710N

STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM
02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA TIA/EIA-568-B.1	(2001; Addendum 2001) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)
EIA TIA/EIA-568-B.2	(2001) Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2)
EIA TIA/EIA-569-A	(1998; Addenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)
EIA TIA/EIA-606-A	(2002) Administration Standard for the Telecommunications Infrastructure (ANSI/TIA/EIA-606)
EIA TIA/EIA-607	(1994) Commercial Building Grounding and Bonding Requirements for Telecommunications (ANSI/TIA/EIA-607)

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-90-661	(2002) Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communications Wiring Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 63.1	(2000) Twisted Pair Premise Voice and Data Communications Cables

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bul. 345-83	(1980) Gas Tube Surge Arrestors (PE-80)

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)

FCC Part 68.5	Waivers

UNDERWRITERS LABORATORIES (UL)

UL 1863	(2000) Communication Circuit Accessories
UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment
UL 497	(2001) Protectors for Paired Conductor Communication Circuits
UL 514C	(1996; Rev thru Nov 2002) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 969	(1995; Rev thru Nov 2001) Marking and Labeling Systems

1.2 RELATED REQUIREMENTS

Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS, Section 16402N INTERIOR DISTRIBUTION SYSTEM, apply to this section with additions and modifications specified herein. The premises distribution shall consist of inside-plant horizontal, riser, and backbone cables and connecting hardware to transport telephone and data (including LAN) signals among equipment items in a building.

1.3 DEFINITIONS

1.3.1 Main Distribution Frame (MDF)

A physical structure at a central location for terminating permanent backbone cables to interconnect with service provider (SP) equipment at the activity minimum point of presence. The MDF generally includes vendor specific components to support voice and data circuits, building surge protector assemblies, main cross connect blocks, equipment support frames, and wood backboard (if MDF is wall mounted). Depending upon local site conditions, the MDF and BDF may be identical.

1.3.2 Building Distribution Frame (BDF)

A structure with terminations for connecting backbone, campus, and horizontal cabling. The BDF generally includes a cross connect, equipment support frame, and wooden backboard or terminal cabinet. The BDF shall include building protector assemblies when used for campus backbone or SP cabling.

1.3.3 Intermediate Distribution Frame (IDF)

An intermediate termination point for horizontal wiring and cross connections within telecommunications closets or wiring closets.

1.3.4 Telecommunications Closet

An enclosed space for telecommunications equipment, terminations, and cross-connect wiring for horizontal cabling.

1.4 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, noncondensing.

1.5 SYSTEM DESCRIPTION

The structured telecommunications cabling and pathway system shall include permanently installed backbone and horizontal cabling, horizontal and backbone pathways, service entrance facilities, work area pathways, telecommunications outlet assemblies, conduit, raceway, and hardware for splicing, terminating, and interconnecting. The horizontal system includes the cabling and pathway between the telecommunications closet and the work area telecommunications outlet. The horizontal system shall be wired in a star topology with the IDF at the center or hub of the star. The backbone cabling and pathway system includes intrabuilding and interbuilding interconnecting cabling, pathway, and terminal hardware to provide connectivity between the MDF's, BDF's, and IDF's. The backbone system shall be wired in a star topology with the MDF at the center or hub of the star.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Telecommunications drawings; G

Distribution frames; G

SD-03 Product Data

Telecommunications cabling (backbone and horizontal); G

Telecommunications outlet/connector assemblies; G

Connector blocks; G

Protector modules; G

SD-06 Test Reports

Telecommunications cabling testing; G

SD-07 Certificates

Contractor Qualifications; G

Manufacturer Qualifications; G

Test plan; G

SD-10 Operation and Maintenance Data

Telecommunications cabling and pathway system Data Package 5; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA and as specified herein.

1.7 ADDITIONAL SUBMITTAL REQUIREMENTS

1.7.1 Telecommunications Drawings

Provide drawings complete with wiring diagrams and details required to prove that the distribution system shall properly support connectivity from the telecommunications equipment room to telecommunications work area outlets. Show the entrance facility and layout of cabling and pathway runs, cross connect points, MDF, BDF, IDF, grounding system, terminating block arrangements and type. Drawings shall depict final telecommunications cabling configuration, including location, color coding, gage, pair assignment, polarization, and terminating blocks layout at cross connect points and patch panels after telecommunications cable installation. Provide a plastic laminated schematic of the as-installed telecommunications cable system showing cabling, BDF's, IDF's, MDF's, and equipment rooms keyed to floor plans by room number. Mount the laminated schematic near the MDF as directed by the Contracting Officer.

1.7.2 Distribution Frames

Provide shop drawing showing layout of applicable equipment including incoming cable stub or connector blocks, building protector assembly, outgoing cable connector blocks and equipment spaces and racks.

1.7.3 Qualifications

1.7.3.1 Minimum Contractor Qualifications

Prior to installation, submit data of provider's experience and qualifications. All work under this section shall be performed by and all equipment shall be provided by a certified Telecommunications Contractor, hereinafter referred to as the Contractor. The Contractor shall have the following qualifications in Telecommunications Systems installation:

a. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment.

b. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products.

c. All installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installation Technicians or have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components. Include names and locations of two projects successfully completed using copper communications cabling systems. Include written certification from users that systems have performed satisfactorily for not less than 18 months. Include specific experience in installing and testing structured telecommunications

distribution systems using Category 3 cabling systems.

1.7.3.2 Minimum Manufacturer Qualifications

The equipment and hardware provided under this contract will be from manufacturers that have a minimum of 3 years experience in producing the types of systems and equipment specified.

1.7.4 Test Plan

Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the UTP components and accessories 60 days prior to the proposed test date. Include procedures for certification, validation, and testing.

1.7.5 Additions to Operation and Maintenance Manuals

In addition to requirements of Data package 5 for the telecommunications cabling and pathway system, include the requirements of paragraph entitled "Telecommunications Drawings."

1.8 DELIVERY AND STORAGE

Provide protection from weather, moisture, dirt, dust, and other contaminants for telecommunications cabling and pathway equipment placed in storage.

PART 2 PRODUCTS

2.1 COMPONENTS

UL or third party certified. Provide a complete system of telecommunications cabling and pathway components using star topology and support structures, pathways, and spaces complete with conduits, pull wires, wireways, cable trays, terminal boxes, outlets, cables, junction boxes, telephone cabinets, and telecommunications closets. Fixed cables and pathway systems for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70.

2.2 PATHWAYS (BACKBONE AND HORIZONTAL)

EIA TIA/EIA-569-A. Pathway shall be conduit, installations. Provide grounding and bonding as required by EIA TIA/EIA-607.

2.2.1 Work area Pathways

Comply with EIA TIA/EIA-569-A. System furniture pathways shall comply with UL 1286.

2.3 TELECOMMUNICATIONS CABLING

Cabling shall be UL listed for the application and shall comply with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2 and NFPA 70. Provide a labeling system for cabling as required by EIA TIA/EIA-606-A and UL 969. Cabling manufactured more than 12 months prior to date of installation shall not be used.

2.3.1 Horizontal Cabling

Comply with NFPA 70, NEMA WC 63.1, ICEA S-90-661 and performance characteristics in EIA TIA/EIA-568-B.1.

2.3.1.1 Horizontal Copper

EIA TIA/EIA-568-B.2, NFPA 70, UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 24 AWG conductors, Category 3 general purpose (CMG) rated, with a blue PVC jacket.

2.4 DISTRIBUTION FRAMES

Provide building distribution frames (BDF's), intermediate distribution frames (IDF's), and main distribution frames (MDF's) as shown on design drawings for terminating and cross connecting permanent cabling.

2.4.1 Building Protector Assemblies

Self-contained unit providing a field cable stub factory connected to protector socket blocks to terminate and accept protector modules for 25 pairs of outside cable. Building protector assembly shall have connector blocks for connection to interior cabling at full capacity.

2.4.1.1 Protector Modules

UL 497, RUS Bul. 345-83, three-electrode gas tube or solid state type rated for the application. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

2.4.2 Connector Blocks

Insulation displacement Type 66 for Category 3 systems. Provide blocks for the number of horizontal and backbone cables terminated on the block plus 25 percent spare.

2.5 TELECOMMUNICATIONS OUTLET BOXES

Standard type 4 inches square by 2 1/8 inches deep. Mount flush in finished walls at height indicated. Outlet boxes for wall-mounted telephones shall be 2 by 4 by 2 1/8 inches deep; mounted at height as indicated. Depth of boxes shall be large enough to allow manufacturers' recommended conductor bend radii.

2.6 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

2.6.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68.5, EIA TIA/EIA-568-B.1, and EIA TIA/EIA-568-B.2. UTP Outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with EIA/TIA Category 3 and requirements. Outlet/connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. Each jack shall be wired T568B. UTP outlet/connectors shall comply with EIA TIA-455-21-A for 500 mating cycles.

2.6.2 Cover Plates

Telecommunications cover plates shall comply with UL 514C, and EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2; flush design constructed of 302 stainless material. Stenciled lettering for voice and data circuits shall be provided using thermal ink transfer process.

2.7 BACKBOARDS

Provide void-free, interior grade plywood 3/4 inch thick as indicated. Backboards shall be fire rated or covered with two coats of gray or a lighter color, nonconductive, fire-retardant paint. Do not cover the fire stamp on the backboard.

2.8 GROUNDING AND BONDING PRODUCTS

Comply with UL 467, EIA TIA/EIA-607, and NFPA 70. Components shall be identified as required by EIA TIA/EIA-606-A. Ground rods shall be in accordance with Section 16402N INTERIOR DISTRIBUTION SYSTEM.

2.9 FIRESTOPPING MATERIAL

Provide in accordance with Section 07840 FIRESTOPPING.

2.10 NAMEPLATES

Provide nameplates for equipment rooms and telecommunications rooms doors in accordance with schedule provided on drawings. Provide equipment nameplates in accordance with Section 16050N BASIC ELECTRICAL MATERIALS AND METHODS.

PART 3 EXECUTION

3.1 INSTALLATION

Telecommunications cabling and pathway systems, including the horizontal and backbone cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware shall be installed in accordance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2, EIA TIA/EIA-569-A, NFPA 70, and UL standards as applicable. Cabling shall be connected in a star topology network. Metal raceway bases, covers, and dividers shall be bonded and grounded in accordance with EIA TIA/EIA-607. Telecommunications cabling and pathways with copper media shall be installed in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling. Pathways shall be installed in accordance with the following minimum clearance distances of 4 feet from motors, generators, frequency converters, transformers, x-ray equipment or uninterruptible power system, 12 in from power conduits, panelboards, and cable systems, 5 inches from fluorescent or high frequency lighting system fixtures.

3.1.1 Cabling

Install Category 3 UTP telecommunications cabling and pathway system as detailed in EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable

terminations. Do not untwist Category 5e UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, 10 ft. in the telecommunications closet 12 inches for UTP. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable bend radii shall not be less than four times the cable diameter.

3.1.1.1 Horizontal Cabling

Install horizontal cabling and pathway as indicated on drawings between telecommunications backboard and telecommunications outlet assemblies at workstations.

3.1.2 Pathway Installations

Comply with EIA TIA/EIA-569-A. Conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of electrical power equipment, flues, steam, and hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit is visible after completion of project. Run conduits in crawl spaces and under floor slabs as if exposed. Install no more than two 90 degree bends for a single horizontal cable run.

3.1.3 Conduit Installed Under Floor Slabs

Conduit shall be located a minimum of 12 inches below the vapor barrier. Seal around conduits at penetrations through vapor barrier.

3.1.4 Service Entrance Conduit, Underground

PVC Type EPC-40. Underground portion shall be encased in minimum of 3 inches of concrete extending from the building entrance to 5 feet out from the building and shall be a minimum of 18 inches below slab or grade.

3.1.5 Work Area Outlets

3.1.5.1 Terminations

Terminate UTP cable in accordance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2 and wiring configuration as specified.

3.1.5.2 Faceplates

As a minimum, each jack shall be labeled as to its function and a unique number to identify cable link.

3.1.5.3 Cables

Unshielded twisted pair and fiber optic cables shall have a minimum of 6 inches of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

3.1.5.4 Pull Cords

Pull cords shall be installed in all conduit serving telecommunications outlets which do not initially have cable installed.

3.1.6 Telecommunications Closet Termination

Install termination hardware required for Category 3 system. An insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

3.1.7 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings in accordance with Section 07840 FIRESTOPPING.

3.1.8 Grounding and Bonding

In accordance with EIA TIA/EIA-607, and NFPA 70.

3.2 LABELING

3.2.1 Labels

All labels shall be in accordance with EIA TIA/EIA-606-A.

3.2.2 Cable

All cables shall be labeled using color labels on both ends with encoded identifiers per EIA TIA/EIA-606-A.

3.2.3 Termination Hardware

All workstation outlets and patch panel connections shall be labeled using color coded labels with encoded identifiers as per EIA TIA/EIA-606-A.

3.3 TESTING

3.3.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2.

3.3.1.1 Inspection

Visually inspect cabling jacket materials for UL or third party certification markings. Visually inspect UTP and optical fiber jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for tip and ring pin assignments, and inspect cabling connections to confirm compliance with EIA TIA/EIA-568-B.1, EIA TIA/EIA-568-B.2. Visually confirm Category 3 marking of outlets, wallplates, outlet/connectors, and patch panels.

3.3.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts,

opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connected. Perform 16 MHz attenuation test for Category 3 systems installations.

3.3.1.3 Performance Tests

a. Category 3 Links. Test each pair for short circuit continuity, short to ground, crosses, and reversed polarity. Include operational and ringback, and dial tone tests.

3.3.1.4 Final Verification Tests

Perform verification tests for UTP systems after the complete telecommunications cabling and workstation outlet/connectors are installed. These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and DSN telephone call.

-- End of Section --

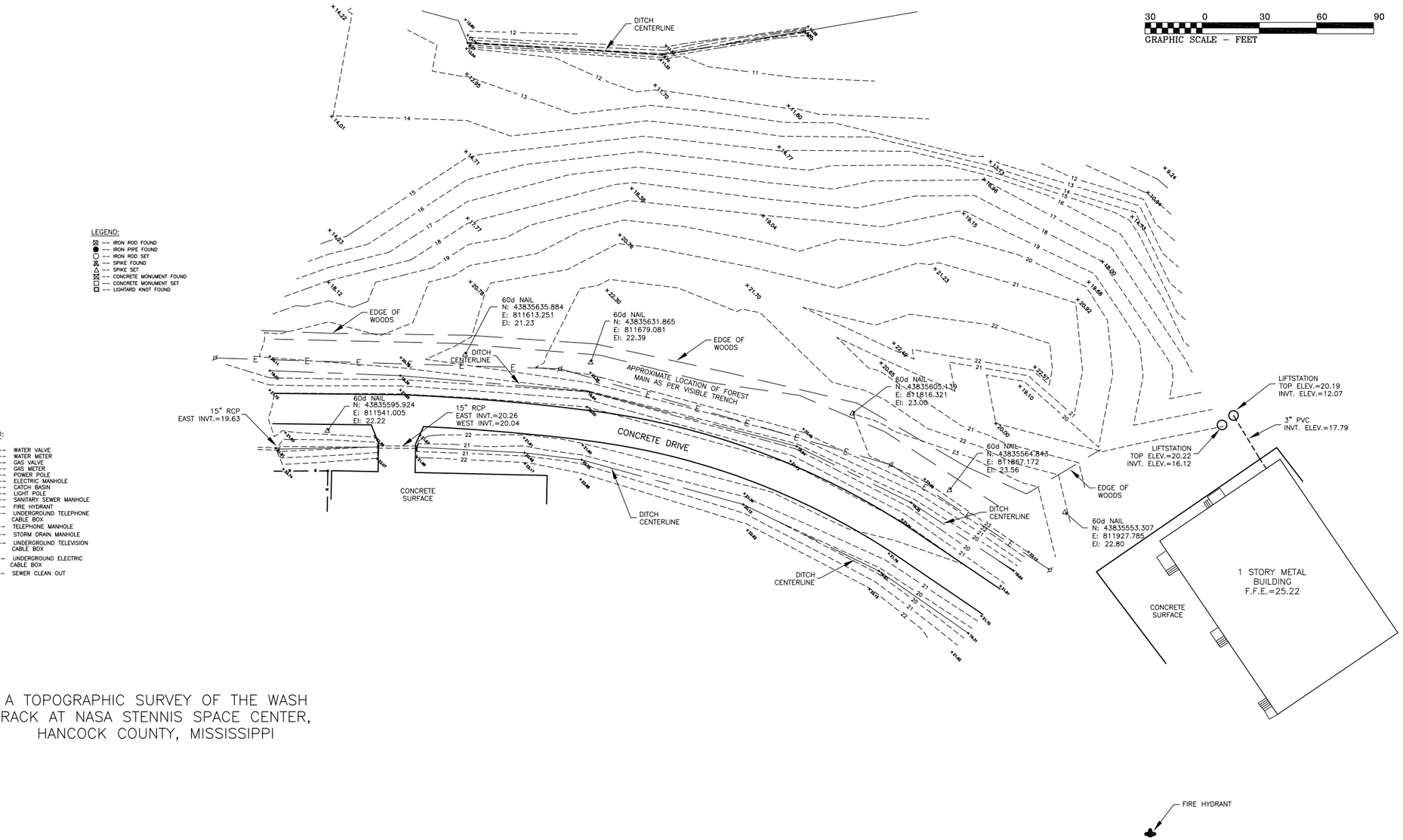
ATTACHMENT 10

WASH RACK FACILITY

Topographic Survey

CROSBY SURVEYING, INC.
PROFESSIONAL LAND SURVEYING

13061 HIGHWAY 67, SUITE A
BILOXI, MISSISSIPPI 39532
PHONE: 228-396-3212
FAX: 228-396-0099



NORTH

30 0 30 60 90
GRAPHIC SCALE - FEET

LEGEND:
- ⊠ -- IRON ROD FOUND
- ● -- IRON PIPE FOUND
- ○ -- IRON ROD SET
- ⊗ -- SPIKE FOUND
- ⊳⊲ -- SPIKE SET
- ▣ -- CONCRETE MONUMENT FOUND
- □ -- CONCRETE MONUMENT SET
- ⊡ -- LIGHTARD KNOT FOUND

UTILITY LEGEND:
- Ⓦ -- WATER VALVE
- Ⓦm -- WATER METER
- Ⓖ -- GAS VALVE
- Ⓖm -- GAS METER
- ○ -- POWER POLE
- Ⓔ -- ELECTRIC MANHOLE
- ▦ -- CATCH BASIN
- ☼ -- LIGHT POLE
- Ⓢ -- SANITARY SEWER MANHOLE
- FIRE HYDRANT
- T -- UNDERGROUND TELEPHONE CABLE BOX
- Ⓣ -- TELEPHONE MANHOLE
- Ⓓ -- STORM DRAIN MANHOLE
- Ⓣv -- UNDERGROUND TELEVISION CABLE BOX
- E -- UNDERGROUND ELECTRIC CABLE BOX
- Ⓒo -- SEWER CLEAN OUT

A TOPOGRAPHIC SURVEY OF THE WASH RACK AT NASA STENNIS SPACE CENTER, HANCOCK COUNTY, MISSISSIPPI

THIS IS TO CERTIFY THAT I HAVE MADE A SURVEY OF THE PROPERTY SHOWN HEREON AND THAT ALL DIMENSIONS AND OTHER DATA SHOWN ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

CLIFFORD A. CROSBY, P.L.S. DATE

JH&H ARCHITECTS PLANNERS INTERIORS
745 N. STATE ST.
JACKSON, MS 39202
601-948-4601
601-355-4200 (f)

DSGN	XXX	DR	CAC	CHK	CAC
SUPV		CH. ENGR	MTC		

SUBMITTED BY (FIRM MEMBER-TITLE): DATE
TECHNICAL BRANCH
FPE

DRAWING REVISIONS

Rev.	Description	Prep By	Date	Apprvd.

NCBC
GULFPORT, MISSISSIPPI
TOPOGRAPHIC SURVEY AT THE WASH RACK
EXISTING TOPOGRAPHIC SURVEY
EFD
DATE
APPROVED
EFD FOR COMMANDER, NAVFAC

Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

RECORD DRAWING DATE	DATE
CODE I.D. NO.	80091
DRAWING SIZE:	D
SPEC. NO.	SPEC#
CONSTRN. CONTR. NO.	CONT#
NAVFAC DRAWING NO.	
SHEET	OF X

SHT#

N:\NAVY\NCBC GULFPORT\SITE PLANS\STENNIS RIVERINE P-201\INCLUDED WITH RFP\SURVEY\WASHRACK SURVEY.dwg 06/03/2008 10:21

ATTACHMENT 11

RECORD OF ENVIRONMENTAL CONSIDERATION FROM NASA

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

April 10, 2008

Reply to the Attn: **RA02**

SBCM Doug Brown, USN
Special Boat Team TWENTY-TWO
Building 2603
Stennis Space Center, MS 39529

Dear Mr. Brown:

The Preliminary Environmental Survey for "P-210 Riverine and Combatant Craft Operations Facility" has been reviewed. Based on the information that you have provided on that checklist and comparison to the Stennis Space Center (SSC) Environmental Resources Document, a Record of Environmental Consideration is enclosed. Attention to the following steps will aid in insuring SSC's compliance with the National Environmental Policy Act:

1. Implement required actions.

2. File a copy of the Record of Environmental Consideration in the appropriate design and construction folder(s).

3. NASA Environmental Management must be notified in the event any change occurs that alters the Preliminary Environmental Survey.

If you should have any questions, please contact Carolyn Kennedy at 228-688-1445.

Sincerely,

Michael J. Blotzer
NASA Environmental Officer

Enclosure
cc:
SBT-22/Paul A. Mullins, B2406
NASA/Hugh Carr
Jacobs Technology/Wendy Robinson

RECORD OF ENVIRONMENTAL CONSIDERATION

The National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.) requires under Section 102 that all Federal agencies consider environmental effects of proposed actions. The Act also specifies under Section 103 that Federal agencies adopt both administrative regulations and policies and procedures to ensure decisions are made in accordance with the purposes and provisions of NEPA. In response to Section 103, the National Aeronautics and Space Administration (NASA) has developed a procedural requirements document NPR 8580.1, Implementing the National Environmental Policy Act and Executive Order 12114. The Stennis Space Center (SSC) procedures are incorporated into the SSC Environmental Operations and Implementation Program Procedures and Guidelines (SPR 8500.2).

The SSC Environmental Resources Document (ERD) describes the current environment and the impacts of NASA operations at SSC. The ERD provides information on the environmental aspects that would normally be included in an environmental impact statement. It is the reference document used in preparing this Record of Environmental Consideration (REC).

An REC may indicate that an Environmental Assessment or an Environmental Impact Statement will need to be prepared to address environmental impacts. An REC may also indicate that the program or project falls under a NASA designated Categorical Exclusion if the actions associated with the program or project do not individually or cumulatively have a significant impact on the environment.

Preliminary Environmental Study Control Number: 08-056

Project Description: This project, considered by Special Boat Team-22, consists of various buildings and facilities to support riverine and combat craft operations. An operations building will house the armories, personal lockers, classrooms, offices and planning areas. A boat maintenance building will be connected to the operations building. Two separate boat storage buildings will be located nearby. This project also includes widening of an existing boat ramp, construction of a sheet pile wall, construction of a helipad and installation of a vehicle wash. The construction site will be approximately seven acres.

Consideration:

- The project will require **timber removal** at the construction site.
- The area of the proposed site will **impact wetlands** and will require mitigation.
- A **large construction storm water permit** will be required by the Mississippi Department of Environmental Quality and will be the responsibility of SBT-22
- An above ground storage tank for diesel fuel will require **secondary containment** according to the NASA Environmental Integrated Contingency Plan.
- Vehicle wash racks require an **oil water separator** to prevent oil and grease from contaminating soil.
- Permits that may be required for **air emissions** (diesel generators) are the responsibility of the SBT-22.
- The new building will utilize the SSC drinking water system and sewage system. Prior to tapping into the SSC **drinking water system**, authorization must be requested from the Mississippi Department of Health. This will be the responsibility of SBT-22.

- Hazardous waste generated during operations must be disposed of according to environmental regulations.
- Affirmative procurement requirements will comply with NAVFAC Construction Standards.
- There are no socio-economic impacts expected.

Action:

- The proposed site must be inspected for timber removal and wetlands impacts. This can be accomplished by calling Hugh Carr, NASA Natural Resources Manager, at 228-688-2466.

- Obtain a Large Construction Storm Water Permit from the Mississippi Department of Environmental Quality.

- Ensure diesel tanks have secondary containment.

- Ensure an oil/water separator is installed for the wash rack.

- Obtain authorization from the Mississippi Department of Health for tapping into the SSC drinking water system

Otherwise, there will be no further environmental action necessary for NASA's compliance with NEPA. SBT-22 would be responsible for compliance with NEPA according to guidance provided by the Naval Special Warfare Command.

Date: 4/10/2008

Name: MICHAEL J. BLOTZER, ENVIRONMENTAL OFFICER

Signature: _____

ATTACHMENT 12

NASA SITE APPROVAL

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

August 16, 2007

Reply to Attn of: **RA10/Project Management Division**

Commander J. A. Emmert
Commander Special Boat Team Twenty-Two
John C. Stennis Space Center
2603 Lower Gainesville Road
Stennis Space Center, MS 39529

Dear Commander Emmert,

We are in receipt of your letter dated August 2, 2007 requesting siting approval for buildings sited on the "revised drawing A 3". The drawing titled "RIVERINE & COMBATANT CRAFT OPERATIONS FACILITY, PROPOSED SITE LAYOUT" dated July 30, 2007 has been reviewed and found to be compatible with the Stennis Space Center's Master Plan and conforms to NASA's letter dated August 14, 2006 concerning project P210 and is hereby approved. The following building numbers are assigned to the buildings identified in the drawing:

Operations Building	2440
Boat Maintenance Building	2441
Boat Storage Building (6 boats)	2442
Boat Storage Building (10 boats)	2443

These numbers should be used on all drawings and documentation associated with each building.

The proposed safety related improvements at the boat ramp are also approved.

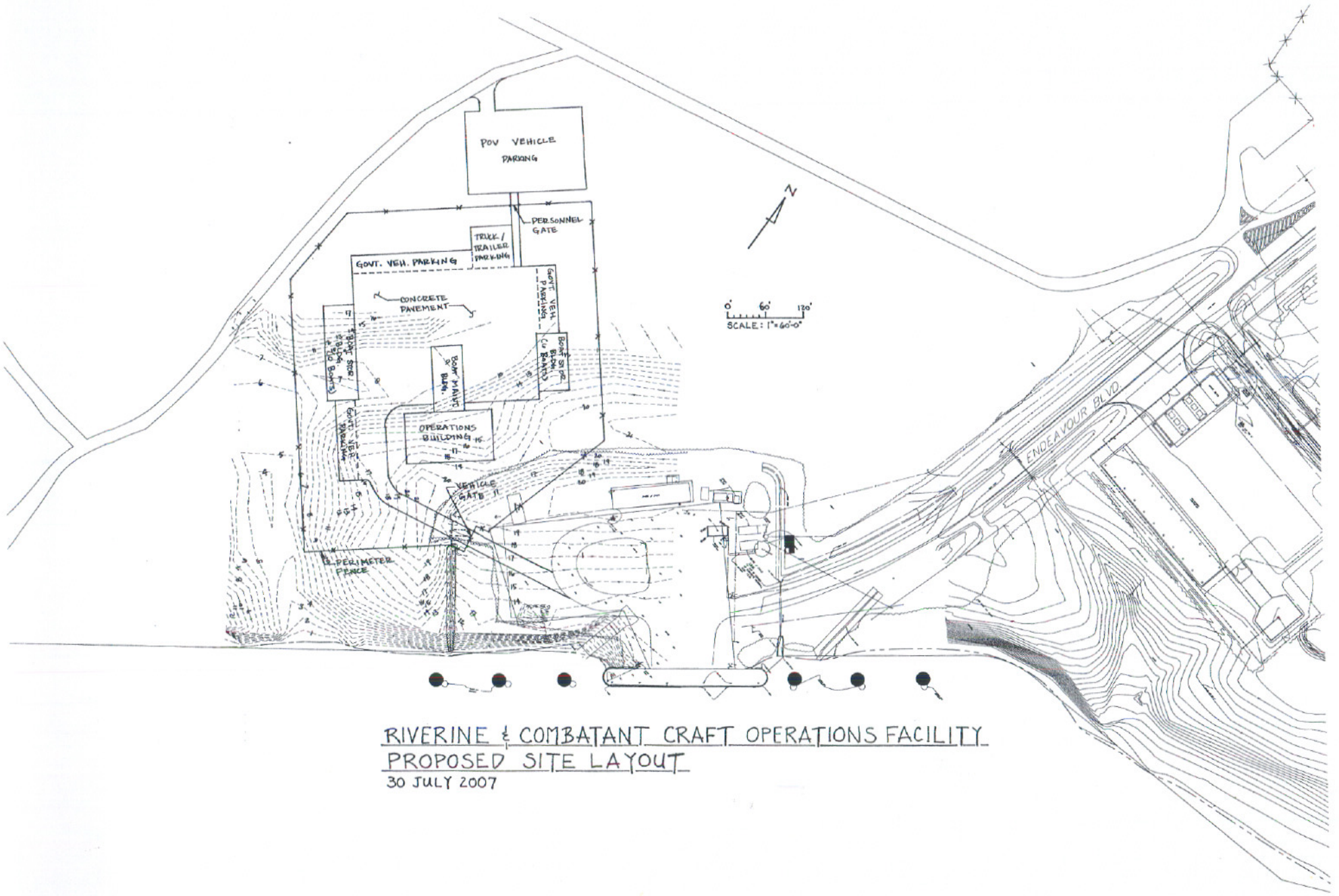
If you have any questions or require additional information please contact the NASA/Stennis Master Planner Mr. Eddie C. Gobert at extension 8-1647.

Sincerely,

Randall R. Canady
Chief

Enclosure

cc:
RA00/Ms. Benigno
RA10/Mr. Gobert
RA20/Mr. Heitzmann
RA30/Ms. Thompson



RIVERINE & COMBATANT CRAFT OPERATIONS FACILITY
PROPOSED SITE LAYOUT
30 JULY 2007