Part 6 – Attachments

D/B RFP Preparation
Final Submittal

National Data Buoy Center
Renovation and Expansion

John C. Stennis Space Center, Mississippi

prepared for

Naval Facilities Engineering Command
Southeast
Charleston, South Carolina

M&H Job No. 0077.04
A/E Contract No: N69450-07-D-0057
Delivery Order: 0004

September 5, 2008

Mason&Hanger
A Day & Zimmermann Company

300 West Vine Street, Suite 1300, Lexington, KY 40507-1814 • (859) 252-9980 • Fax (859) 389-8870
masonandhanger.com
The Mason & Hanger Group Inc.

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 1

Geotechnical Report

ATTENTION

IMPORTANT INFORMATION

The Geotechnical information provided in this RFP is provided for the Contractor's information only, and is intended to convey information regarding site conditions only. Minor variations in soil and ground water conditions should be anticipated and incorporated in the Contractor's bid. The assumptions, analysis and recommendations included in the report are not intended as a basis for bidding or for use in design as the assumptions may be inconsistent with the bidder's design. Requirements stated in Parts 3 and 4 of the RFP take precedence over any recommendation in the attached Geotechnical report. The Contractor is advised to retain a Geotechnical Engineer experienced and licensed in the geographic region of the project to interpret the provided data as related to his design concept and develop requirements for bidding. Additional requirements for the geotechnical design of this project are provided elsewhere in this RFP.

PSI Information To Build On
Engineering • Consulting • Testing

August 20, 2008

The Mason & Hanger Group, Inc.
300 West Vine Street
Suite 1300
Lexington, Kentucky 40507

Attention: Mr. Ron Hollinger

Re: Geotechnical Engineering Report
Proposed National Data Buoy Center
Renovation and Expansion
Stennis Space Center, Mississippi
PSI File Number 254-85040-1

Dear Mr. Hollinger:

Professional Service Industries, Inc. is pleased to transmit our Geotechnical Engineering Report for the referenced project. This report includes the results of field and laboratory testing, and recommendations for foundation and pavement design, as well as general site development for the proposed National Data Buoy Center Renovation and Expansion at Stennis Space Center in Mississippi.

We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Rupesh R. Kadam E.I.T.
Project Manager
Geotechnical Services

Tony Y. Maroun, P.E.
Vice President

8/20/08

RRK/TYM:smt

GEOTECHNICAL ENGINEERING REPORT

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

PSI FILE NUMBER 254-85040-1

PREPARED FOR

THE MASON & HANGER GROUP, INC.
300 WEST VINE STREET
SUITE 1300
LEXINGTON, KENTUCKY 40507

AUGUST 20, 2008

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
724 CENTRAL AVENUE
JEFFERSON, LOUISIANA 70121

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EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed National Data Buoy Center Renovation and Expansion at Stennis Space Center, Mississippi.

The project includes the addition to buildings 3205 and 3202 and construction of a new Paint and Blast Booth. The addition to building 3202 will be a pre-engineered metal framed building with insulated metal panel walls and will be utilized as a machine shop. The addition will have a footprint of about 10,730 (73' x 147') square feet. The addition to building 3205 will also be a pre-engineered metal framed building having a footprint of about 14,400 (80' x 180') square feet. We understand that two-thirds of the building space will be utilized as office and the remaining one-third will be used as a part storage area and electronics test laboratory. The new Paint and Blast Booth will be a single story structure with an eave height of 71 feet. The building will have a plan area of 5,000 square feet. Structural loading information provided to us by Mr. Ron Hollinger indicates that maximum column and wall loads will be on the order of 50 kips and five (5) kips per linear foot, respectively. Detailed grading information was not available at the time this report was prepared. However, it is understood that minimal amount of fill will be needed to achieve the floor slab design elevations.

The project site for the proposed National Data Buoy Center Renovation and Expansion was characterized by drilling a total of seven (7) borings to depths ranging from 25 to 80 feet below the existing ground surface. Based on the borings, about six (6) inches of brown silty topsoil with organics covered the project site. The topsoil is underlain by brownish gray silty clayey sand or brownish gray sandy silt. This was followed by tannish gray silty sandy clay or silty clayey sand and extended to depths of four (4) to 12 feet. This was underlain by alternating layers of tannish gray/tan and gray clayey sand, or fat clay to a depth of 17 feet where a stratum of brown to dark brown organic clay to peat was encountered in the borings and extended to a depth of about 22 feet. Below the organic clay, layers of gray fat clay, clayey sand and poorly graded sand were encountered and extended to the maximum explored depth of 80 feet. Groundwater was measured at depths of 6.5 to 10 feet in the borings during drilling or 24 hours after completion of drilling.

Based on the field data and laboratory tests results, the proposed Building additions and paint and blast booth can be supported on a shallow foundation system, provided the building pads are prepared as recommended in the "Site Preparation" section of this report. Spread footings and continuous footings bearing at least two (2) feet below finished grades in the natural soils or compacted structural fill could be designed for maximum net allowable bearing pressures of 2,000 psf and 1,500 psf, respectively, based on dead loads and design live loads. The floor slab should be soil supported on a minimum of two (2) feet of compacted low plasticity structural fill.

The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this report prior to utilizing our engineering recommendations in preparation of design/construction documents.

PROJECT INFORMATION

Project Authorization

Professional Service Industries, Inc. (PSI) completed a geotechnical exploration for the proposed National Data Buoy Center Renovation and Expansion to be constructed at Stennis Space Center in Mississippi. This exploration was accomplished in general accordance with PSI Proposal Number 254-750120R-1 dated September 25, 2007.

Project Description

The project includes the addition to buildings 3205 and 3202 and construction of a new Paint and Blast Booth. The 3202 building addition will be a pre-engineered metal framed structure with insulated metal panel walls and will be utilized as a machine shop. The addition will have a footprint of about 10,730 (73' x 147') square feet. The 3205 building addition will be a pre-engineered metal framed structure having a footprint of about 14,400 (80' x 180') square feet. We understand that two-thirds of the building space will be utilized as office and the remaining one-third will be used as a part storage area and electronics test laboratory.

The new Paint and Blast Booth will be a single story structure with an eave height of 71 feet. The building will have a plan area of 5,000 square feet. Structural loading information provided to us by Mr. Ron Hollinger indicates that maximum column and wall loads will be on the order of 50 kips and five (5) kips per linear foot, respectively. Detailed grading information was not available at the time this report was prepared. However, it is understood that minimal amount of fill will be needed to achieve the floor slab design elevations.

The geotechnical recommendations presented in this report are based on the available project information, building locations, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of acceptable foundation and pavement systems for the proposed building additions at Stennis Space Center in Mississippi. Our scope of services included drilling a total of seven (7) soil borings (B-1 through B-7) at the site to depths ranging from 25 to 80 feet below the existing ground surface. Our scope also included a reconnaissance of the project site, laboratory testing on selected samples, and preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- Foundation types, allowable bearing capacities, and an estimate of settlement;
- General pavement design criteria and pavement subgrade preparation;
- Site preparation and fill requirements;
- Comments regarding factors that will impact construction and performance of the proposed construction.

The scope of services did not include an environmental assessment for determining the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

Additionally, PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. The client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The client further acknowledges that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site for the proposed National Data Buoy Center Renovation and Expansion is located on the east side of Road "H"/Highway 43 at Stennis Space Center, Mississippi. The addition to building 3202 is located on the north side of building 3202 and the addition to building 3205 is located on the west side of building 3205. The addition areas are currently vacant grassy areas. A drainage ditch about two (2) feet wide was observed on the north side of building 3202 and runs in the east-west direction. The new Paint and Blast Booth is located to the northeast side of building 3202.

Our track mounted drill rig experienced slight difficulties moving around the site. Detailed grading information was not available at the time this report was prepared. However, we understand that the finished grades design have been set to match the existing buildings finished grades and therefore, minimal amount of fill (less than two (2) feet) will be required within the new building addition footprints.

Field Exploration

The field exploration, which was performed to evaluate the engineering characteristics of the foundation materials, included a reconnaissance of the project site, drilling the requested soil borings and recovering undisturbed and disturbed soil samples. Water level measurements of any groundwater encountered in the test borings were also observed and recorded.

The project site was characterized by drilling a total of seven (7) borings to depths ranging from 25 to 80 feet. Borings B-1 through B-3 were drilled to depths of 25 feet to 40 feet below existing ground surface within Building 3202 addition area. Borings B-4 through B-6 were drilled to depths of 25 feet to 40 feet below the existing ground surface within the addition footprint of Building 3205. Boring B-7 was drilled within the footprint of the Paint and Blast Booth to a depth of 80 feet. As instructed by Mr. Hollinger, the planned borings (B-8 and B-9) for the new rope storage structure were not performed at the time and recommendations for this facility will not be under this scope of services. The boring depths are in reference to the existing surface at the time of our field exploration. The borings were located in the field by PSI personnel and a Stennis Space Center representative. The approximate locations of the borings are indicated on the site plan included in the Appendix.

Drilling and Sampling Procedures

The borings were drilled with track mounted drilling rig. Wet rotary drilling techniques were used to advance the boreholes. Samples were generally obtained continuously from the ground surface to a depth of about ten (10) feet and at maximum five (5) foot intervals thereafter. Drilling and sampling techniques were accomplished in general accordance with ASTM Standard Procedures.

Undisturbed samples of cohesive soils were generally obtained using three (3) inch diameter thin-wall tube samplers (Shelby tubes) in general accordance with the procedures for "Thin-Walled Tube Geotechnical Sampling of Soils" (ASTM D1587). These samples were extruded in the field with a hydraulic ram.

For cohesionless soils and semi-cohesive soils, Standard Penetration Tests (SPT) were performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling 30 inches, required to advance the split-barrel sampler one (1) foot into the soil. To perform the test and obtain a sample, the sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. Samples of granular soils were obtained utilizing a two (2) inch O.D. split-barrel sampler in general accordance with procedures for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D-1586).

The samples were identified according to boring number and depth, placed in polyethylene plastic wrapping to protect against moisture loss, and transported to the laboratory in special containers to prevent disturbance. All of the samples obtained from the field exploration were identified and evaluated by experienced geotechnical personnel upon arrival at the laboratory.

Laboratory Testing Program

In addition to the field exploration, a supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of the foundation materials. The laboratory testing program included visual classification and water content tests on all samples. In addition, selected samples were subjected to unconfined compressive strength tests, Atterberg Limits tests and percent finer than the #200 sieve tests. Estimates of unconfined compressive strength and undrained shear strength were also determined through the use of a hand penetrometer and a torvane, respectively.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM Standard Procedures. The results of these tests are to be found on the accompanying boring logs in the Appendix.

Subsurface Conditions

Based on the borings, about six (6) inches of brown silty topsoil with organics covered the project site. The topsoil is underlain by brownish gray silty clayey sand or brownish gray sandy silt. This was followed by tannish gray silty sandy clay or silty clayey sand and extended to depths of four (4) to 12 feet. This was underlain by alternating layers of tannish gray/tan and gray clayey sand, or fat clay to a depth of 17 feet where a stratum of highly compressible brown to dark brown organic clay to peat was encountered in borings at a depth of about 17 feet and extended to a depth of about 22 feet. Below the organic clay, alternating layers of gray fat clay, clayey sand and poorly graded sand was encountered and extended to the maximum explored depth of 80 feet.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. The samples, which were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Information

Groundwater was measured at depths of 6.5 to 10 feet in borings during drilling or 24 hours after completion of drilling. The groundwater level presented in the report was measured during the drilling operations and it may not have become fully static at the time of measurement. In any event, groundwater could fluctuate at this site due to seasonal precipitation and variation in weather conditions. We recommend that the actual groundwater level at the site be determined at the time of the construction activities.

Seismic Conditions

The International Building Code (IBC), 2003 Edition, was reviewed to determine the classification for the proposed site. Based on the subsurface conditions encountered and the laboratory test results, the project site is classified as "Class E", as outlined in Section 1615.1.1 of the 2003 IBC.

FOUNDATION DESIGN AND RECOMMENDATIONS

General

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movement which the structure can withstand without damage.

Based on the field data and laboratory tests results, the new building and proposed additions can be supported on a shallow foundation system, provided the near surface soils are prepared as detailed in the site preparation section of the report. A stratum of highly compressible dark brown organic clay with peat was encountered in the borings at a depth of about 17 feet and extended to a depth of about 22 feet. Although, the near surface soils at the site are medium dense sandy soils to stiff clays, the underlying organic clay could experience some amount of settlement if a large amount of fill is used to raise the site grades.

Details related to site preparation, foundation and pavement recommendations are presented in subsequent sections of this report.

Site Preparation

Site preparation is expected to include, but not be limited to stripping of all vegetation, topsoil, and any other deleterious material from the areas to be developed. Based on the borings, the topsoil extended to about six (6) inches. However, the actual stripping depth should be determined by a representative of the geotechnical engineer at the time of construction. The drainage swale at the site should be rerouted away from the building area. Vegetation and topsoil within the existing drainage swale should be stripped and removed prior to filling.

After stripping, a minimum of two (2) feet of the soil in the building area and extending 5 feet beyond the building perimeter should be undercut. The excavated soils can be stockpiled separately for later use provided they are free of deleterious materials and meet the requirements for structured fill indicated in the report. After undercutting to the required depth, the exposed subgrade in the building and parking areas should be proof-rolled with a loaded tandem axle dump truck or similar heavy rubber tired vehicle. Soils, which are observed to rut or deflect excessively under the moving load, should be undercut and replaced with properly compacted structural fill. The proof rolling, undercutting and filling activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

After subgrade preparation has been completed, fill placement may begin. The first layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and scarified subgrade soils. The structural fill materials should be free of organic or other deleterious materials, have a maximum particle size of less than 2 inches and have a liquid limit less than 40 percent and a plasticity index less than 18. Sandy clays or clayey sands are recommended for use as structural fill. The near surface silty clayey sands can be used as structural fill, provided they meet the above criteria.

The structural fill should be compacted to at least 95 percent of the soil's maximum dry density as determined by ASTM Designation D698 (Standard Proctor). The fill should be placed in maximum lifts of eight inches of loose material and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted structural fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. The compacted fill should extend at least five (5) feet beyond the edge of the building prior to sloping. Adequate drainage must be provided prior to and during site work. The site should be graded to promote rapid runoff.

Shallow Foundation

Based on the field data and laboratory test results, the proposed buildings may be supported on a shallow foundation system, provided the near surface soils are improved by re-compacting the upper two (2) feet of soils. Spread footings and continuous footings, bearing on the natural soils or compacted structural fill at least two (2) feet below finished grade, could be designed for maximum net allowable bearing pressures of 2,000 psf and 1,500 psf, respectively, based on dead loads and design live loads. Minimum dimensions of twenty-four (24) inches for column footings and eighteen (18) inches for continuous footings should be used in foundation design to minimize the possibility of a localized bearing failure. The above bearing capacities include a design factor of safety three (3).

The uplift resistance of shallow spread footings formed in open excavations should be limited to the weight of the foundation concrete and the soil above it. For preliminary design purposes, the uplift resistance can be computed by using a total unit weight of 115 pcf for the structural fill placed and compacted above the footing and a unit weight of 150 pcf for the concrete. Concrete reinforcing steel should be properly sized to resist uplift forces. We recommend that a factor of safety of at least 1.5 be used when determining the allowable uplift resistance of spread footings.

Soil resistance to horizontal forces is developed by lateral earth pressures acting on the face of the footing and by friction or adhesion on the footing base. We recommend that the allowable passive pressure be computed for spread footings below grade using the following equation:

$$P_p = 350H \text{ (Sand)}$$
$$P_p = 1500 + 120\,H \text{ (Clay)}$$

where P_p is the lateral soil resistance in psf (pounds per square foot) and H is the depth in feet. For exterior footings, H is measured from one (1) foot below adjacent finished grade, provided that the adjacent finished grade extends level and at least beyond a point that makes a 45-degree angle from the bottom of the exterior footing to the finished ground surface.

The top foot of passive resistance at foundations should be neglected unless the ground surface around the footing is covered by concrete or pavement. The resistance to sliding of spread footing bearing in structural fill can be computed by multiplying the footing base contact area by a sliding friction factor of 0.38. Spread footings should also be sized to resist overturning due to moment forces. Concrete reinforcing steel should be properly sized to resist horizontal and moment forces.

The foundation excavations should be observed by a representative of PSI prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the geotechnical engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted select fill or graded compacted crushed stone, as determined by the Geotechnical Engineer.

Footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Settlement

Based on the recommended bearing pressure and up to a maximum footing size of 7 feet x 7 feet, the maximum settlement will be less than one (1) inch. Differential settlement is estimated to be less than ½ inch. While settlement of this magnitude is generally considered tolerable for structures of the type proposed, the design of any masonry walls should include provisions for liberally spaced, vertical control joints to minimize the effects of cosmetic cracking.

Floor Slabs

The floor slabs for the proposed building additions should be soil supported on a minimum of 24 inches of compacted low plasticity fill material. Placement of the fill and preparation of the subgrade should be performed to identify any soft or unstable soils which should be removed from the floor slab areas prior to additional fill placement and/or floor slab construction.

Polyethylene sheeting should be placed between the fill and the floor slabs to act as a vapor barrier. The floor slabs should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Pavement Recommendations

The performance of pavements depends upon several factors including (1) the characteristics of the supporting soils; (2) the magnitude and frequency of wheel load applications; (3) quality of construction materials; (4) the contractor's placement and workmanship abilities, and (5) the desired period of design life. PSI has evaluated both rigid and flexible pavements for this project.

Detailed grading information was not available at the time this report was prepared. However, since the site was previously developed, it is assumed that about 1 to 1.5 feet of fill will be required to achieve the parking areas design grades. No traffic information was provided by which to design the pavements at this site. Therefore, it was assumed that the site traffic will consist of 1,000 cars/day, 4-heavy trucks/day, and four 16-wheelers/week over a 20 year design period.

The recommended pavement sections presented are considered typical and minimum for the assumed parameters in the general site area and anticipated traffic condition. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the owner and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life. The pavement subgrade should be prepared as discussed in the site preparation section of this report.

Our scope of services did not include extensive sampling for determination of coefficient of subgrade reaction (k) and California Bearing Ratio (CBR) of existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types. A California Bearing Ratio (CBR) of 3 and a modulus of subgrade reaction (k) of 100 psi/in were assumed for the near surface re-compacted sand or structural fill. Additionally, we assumed the following parameters:

Reliability	85%
Standard Deviation	0.45 Asphalt, 0.35 Concrete
Initial Serviceability	4.2
Terminal Serviceability	2.0
Drainage Coefficient	1.0
Design Life	20 Years
Layer Coefficients	0.41 Asphalt, 0.14 Limestone Base
	0.08 Structural Fill

Considering the above assumptions and our previous experience with similar projects, we recommend the following pavement sections:

FLEXIBLE PAVEMENT Recommended Minimum Thicknesses, Inches		
Pavement Materials	Light Duty	Heavy Duty
Asphaltic Concrete Wearing Course	3	4
Compacted 610 Limestone Base	8	10
Compacted Structural Fill	12	12

RIGID PAVEMENT Recommended Minimum Thicknesses, Inches		
Pavement Materials	Light Duty	Heavy Duty
Portland Cement Concrete	5	7
Compacted Granular Fill	12	12

Portland Cement Concrete pavements should be utilized where waste disposal containers are located. The concrete paved area should be sufficiently large so that the front wheels of the collection truck are supported on the rigid pavement. In this area and in areas which will be accessed by heavy trucks (solid waste trucks, delivery trucks, etc.), a minimum concrete pavement thickness of seven (7) inches underlain by twelve (12) inches of compacted granular fill is recommended.

The asphaltic concrete should meet the requirements of the latest edition of the Mississippi Standard Specifications for Road and Bridge Construction, Sections 401 and 703 and should be compacted to a minimum of 95 percent of the density of the laboratory-molded specimen. The stone base should consist of 610 limestone conforming to MDOT Specifications, and should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D698 (Standard Proctor) within 3 percent of optimum moisture content.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints should be designed in accordance with current Portland Cement Association guidelines. Joints should be connected with smooth, greased or sleeved dowels and should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils.

The design of steel reinforcement should be in accordance with accepted codes. The concrete should have a minimum flexural strength of 650 psi at 28 days. The concrete should also be designed with 5±1 percent entrained air to improve workability and durability. Long-term pavement performance requires good drainage and performance of periodic maintenance activities. Therefore, water should not be allowed to pond behind curbs and saturate the pavement base. In down grade areas, the base should extend through the slope to allow any water entering the base a path to exit.

CONSTRUCTION CONSIDERATIONS

It is recommended that PSI be retained to provide observation and testing of construction activities involved in the foundations and pavements, earthwork, and related activities of this project. PSI cannot accept any responsibility for any conditions, which deviated from those described in this report, nor for the performance of the foundations and pavements if not engaged to also provide construction observation and testing for this project to ensure that the recommendations presented herein are implemented.

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are relatively sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, an increase in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Drainage and Groundwater Concerns

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab.

Groundwater was measured at depths of about six and one-half (6½) to 10 feet below the existing ground surface in the borings during drilling or 24 hours after completion of drilling. However, it is possible that seasonal variations will cause fluctuations of the water table. Additionally, perched water may be encountered in discontinuous zones within the overburden. Any water accumulation should be removed from excavations by pumping. Should excessive and uncontrolled amounts of seepage occur, the geotechnical engineer should be consulted.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties compliance with local, state, and federal safety or other regulations.

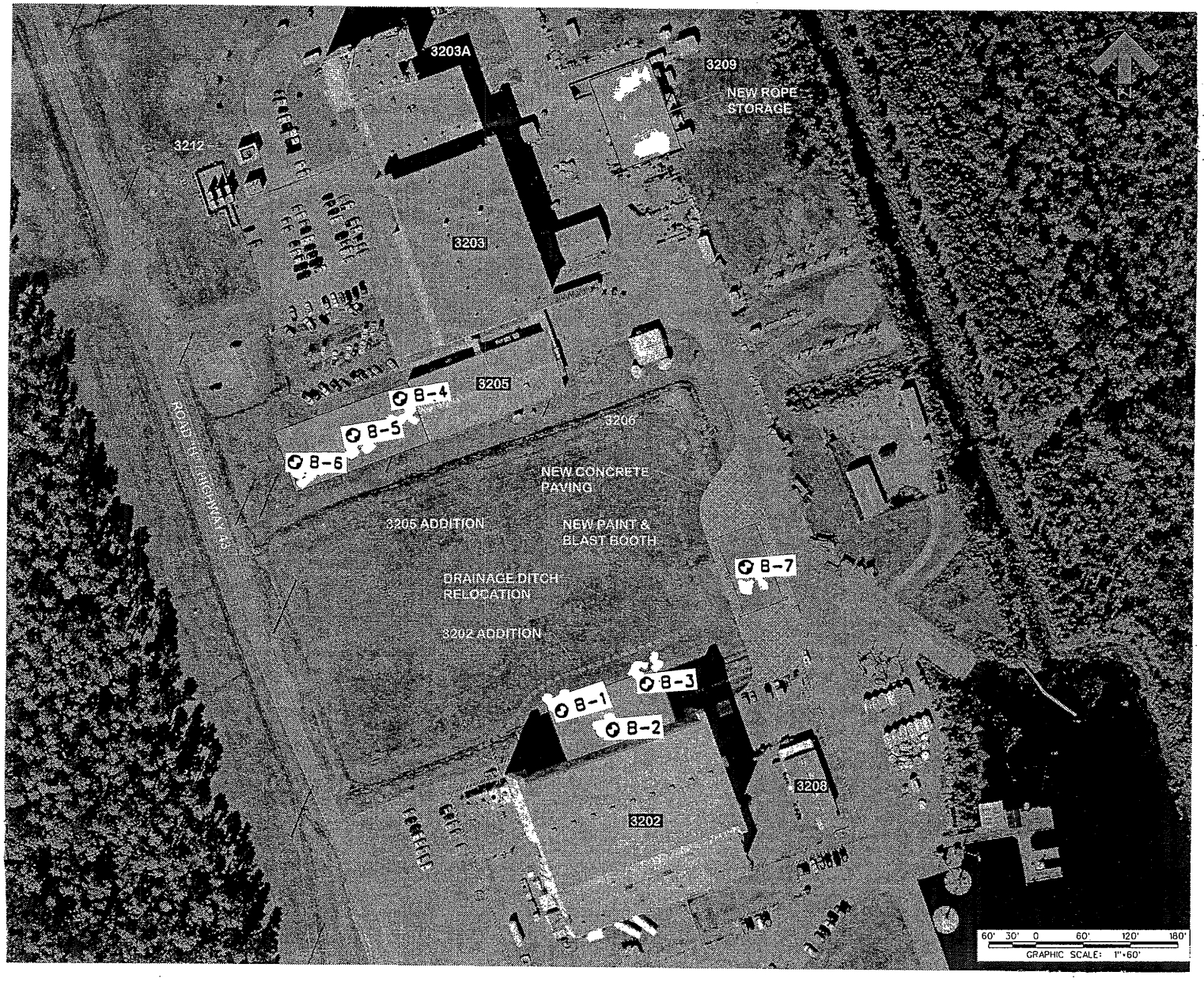
REPORT LIMITATIONS

The recommendations submitted in this report are based on the available project information and subsurface information obtained by PSI. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of The Mason and Hanger Group, Inc. for the specific application to the proposed National Data Buoy Center Renovation and Expansion to be constructed at Stennis Space Center in Mississippi.

APPENDIX



Boring Location

Prop. National Data Buoy Center
Renovation & Expansion
Stennis Space Center, Mississippi

Boring Location Plan

Professional Service Industries, Inc.
724 Central Ave
Jefferson, LA 70121 Ph. (504) 733-9411

Date: 8/15/08 | PSI Project No.: 254-85040-1

Drawg Provd by: The Mason & Hanger Group, Inc.

LOG OF BORING B-1

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3202 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics Medium dense brownish gray Silty Clayey Sand	21					10			
			Very stiff, tannish gray Silty Sandy Clay	20					21			
5						3.0			17			
			Loose to medium dense tan and gray Clayey Sand ▼	9					16			
10				11					21			21
			Firm gray Fat Clay	4					66	98	70	
15												
			Firm brown to dark brown organic Clay with Peat				0.35		170			
20												
			Loose gray Clayey Sand	6					19			
25												
			Boring terminated at 25 feet									
30												
35												
40												
45												
50												

DEPTH OF BORING: 25 Feet | GROUNDWATER: Measured at 7.5 feet after 24 hours

DATE: 7/15/08

LOG OF BORING B-2

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3202 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil w/ organics	13					8			36
			Medium dense brownish gray Clayey Sand									
			Medium dense tannish gray Silty Clayey Sand	15					16			
5				10					11			
				14					14			
10			- clay layer, 8' to 10' ▼	14					18			33
15			Medium dense gray Clayey Sand	15					28			
20			Very soft gray organic Clay with peat			0.10			105			
25			Firm, gray Fat Clay	6					68			
30			Medium dense, gray poorly graded Sand	19					23			7
35			Very soft, gray Lean Clay	2					43	43	16	
			- stiff, 35' to 37'			1.25			35			
40			Loose, gray Clayey Sand	9					16			
45			Boring terminated at 40 feet									
50												

DEPTH OF BORING: 40 feet | GROUNDWATER: Measured at 9 feet during drilling

DATE: 7-17-08

LOG OF BORING B-3

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3202 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics Medium dense, brownish gray Sandy Silt	28					10			58
			Stiff tannish gray Silty Sandy Clay	28					12			
5			Medium dense, tannish gray Clayey Sand	19					15			
			▼	13					20			
10				15					18			
			Firm, gray Fat Clay				0.30		56			
15												
			Firm, dark brown organic Clay with peat			1.0			125			
20												
			Medium dense, gray Clayey Sand	14					20			
25												
			Boring terminated at 25 feet									
30												
35												
40												
45												
50												

DEPTH OF BORING: 25 feet | GROUNDWATER: Measured at 6.5 feet after 24 hours

DATE: 7-15-08

LOG OF BORING B-4

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3205 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics	23					8			41
			Medium dense, brownish gray Silty Clayey Sand	18					17			
5			Stiff to very stiff, tannish gray Silty Sandy lean Clay		1.72	3.0		108	20	42	27	
						2.25			19			
10			Medium dense, tannish gray Clayey Sand ▼	11					15			21
15			Soft, gray Fat Clay				0.20		77			
20			Firm, gray to dark brown organic Clay w/ peat				0.40		103			
25			Loose to medium dense, gray Clayey Sand	5					21			
30				17					17			34
35				26					20			
40			-becomes poorly graded Sand, 38' to 40'	26					18			
45			Boring terminated at 40 feet									
50												

DEPTH OF BORING: 40 feet | GROUNDWATER: Measured at 10 feet during drilling

DATE: 7-15-08

LOG OF BORING B-5

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3205 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6"brown silty topsoil with organics	18					8			
			Medium dense, brownish gray Silty Clayey Sand	11					22			
5			Stiff, tannish gray Silty Sandy Clay		2.0	2.0		108	20			
			▼		1.61	1.5		114	17			
10			Medium dense, tannish gray Clayey Sand	15					20			14
15			Soft, gray Fat Clay				0.15		68			
20			Very soft, gray to dark brown organic Clay				0.05		89			
25			Medium dense, gray Clayey Sand	16					19			
30			Boring terminated at 25 feet									
35												
40												
45												
50												

DEPTH OF BORING: 25 feet | GROUNDWATER: Measured at 7 feet after 24 hours

DATE: 7-16-08

LOG OF BORING B-6

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: 3205 BUILDING ADDITION | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics	22					10			
			Medium dense, brownish gray Silty Clayey Sand		2.8	3.5		112	16			
5			Very stiff, tannish gray Silty Sandy Clay			4.5			15			
			Medium dense, gray poorly graded sand ▼	19					18			11
10				18					23			
			Soft, gray Fat Clay				0.25		59	63	31	
15												
			Soft, dark brown organic Clay with peat				0.5		149	200	132	
20												
			Dense, gray Clayey Sand	36					20			
25			Boring terminated at 25 feet									
30												
35												
40												
45												
50												

DEPTH OF BORING: 25 feet | GROUNDWATER: Measured at 8 feet during drilling

DATE: 7-16-08

LOG OF BORING B-7

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TYPE OF BORING: WET ROTARY | LOCATION: PAINT AND BLAST BOOTH | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" silty topsoil with organics	12					6			30
			Medium dense, brownish gray Silty Clayey Sand	17					16			
5			Stiff to very stiff, tannish gray Silty Sandy Clay		1.55	3.5		110	18			
			Medium dense, tannish gray Clayey Sand	18					16			
10			▼	24					20			14
			Medium dense, gray Sandy Silt	15					29			
15												
			Very soft, gray to dark brown organic Clay with peat					0.10	110	147	106	
20												
			Stiff, gray Sandy Clay	12					19			
25												
			Medium dense, gray poorly graded Sand	19					21			6
30												
				11					22			
35												
				40					17			
40												
				39					18			
45												
				23					12			
50												

DEPTH OF BORING: 80 feet | GROUNDWATER: Measured at 9.5 feet during drilling

DATE: 7-17-08

LOG OF BORING B-7 (continued)

PROPOSED NATIONAL DATA BUOY CENTER
RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

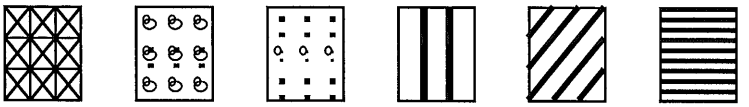
TYPE OF BORING: WET ROTARY | LOCATION: PAINT AND BLAST BOOTH | PSI PROJECT NO.: 254-85040

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
55			-with a trace of organics, 53' to 55'	23					4			3
60				62					17			
65				87					16			
70				58					19			
75			- clayey sand, 73' to 75'	41					17			15
80				77					11			
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 FEET
DATE: 7-17-08

KEY TO TERMS AND SYMBOLS USED ON LOGS

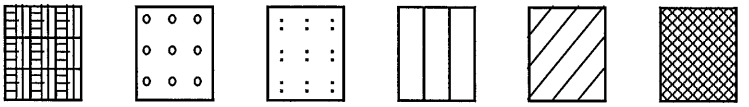
SOIL TYPE



SAMPLER TYPE



MODIFIERS





UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

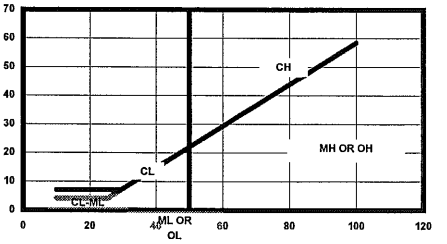
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIABLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND, GRAVELY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELY SAND (L.FINES)
		SANDS WITH APPREA. FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN-MADE SOIL MIXTURES	

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT^2
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

HP - HAND PENETROMETER
TV - TORVANE
MV - MINIATURE VANE
UC - UNCONFINED COMPRESSION TEST
UU - UNCONSOLIDATED UNDRAINED TRAIXIAL
CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

▼ DELAYED GROUNDWATER LVL

▽ LEVEL GROUNDWATER ENCOUNTERED

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.76	2.0	0.42	0.074		0.002

GRAIN SIZE IN MM

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 2

Asbestos Survey Reports

Building 3202

Building 3205

Building 3209 Area

BAT

BAT ASSOCIATES, INC.

COMPLETION REPORT

PRE-DEMOLITION/RENOVATION ASBESTOS SURVEY
BUILDING 3202
STENNIS SPACE CENTER, MS



PREPARED FOR:

MASON AND HANGER, INC.
300 WEST VINE STREET, SUITE 1300
LEXINGTON, KY 40507-1814

PREPARED BY:

BAT ASSOCIATES, INC.
5151 BROOK HOLLOW PARKWAY, SUITE 250
NORCROSS, GA 30071

JUNE 5, 2008

TABLE OF CONTENTS

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2.0 INSPECTION FOR ASBESTOS-CONTAINING MATERIALS 3
2.1 Purpose 3
2.2 Inspection for Asbestos-Containing Materials 3
2.2.1 Building 3209 Area 3

3.0 CONCLUSIONS AND RECOMMENDATIONS 7
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Figure 2 Sample Locations 4
Figure 3 Area Not Assessed During Survey 6

LIST OF TABLES

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LIST OF APPENDICES

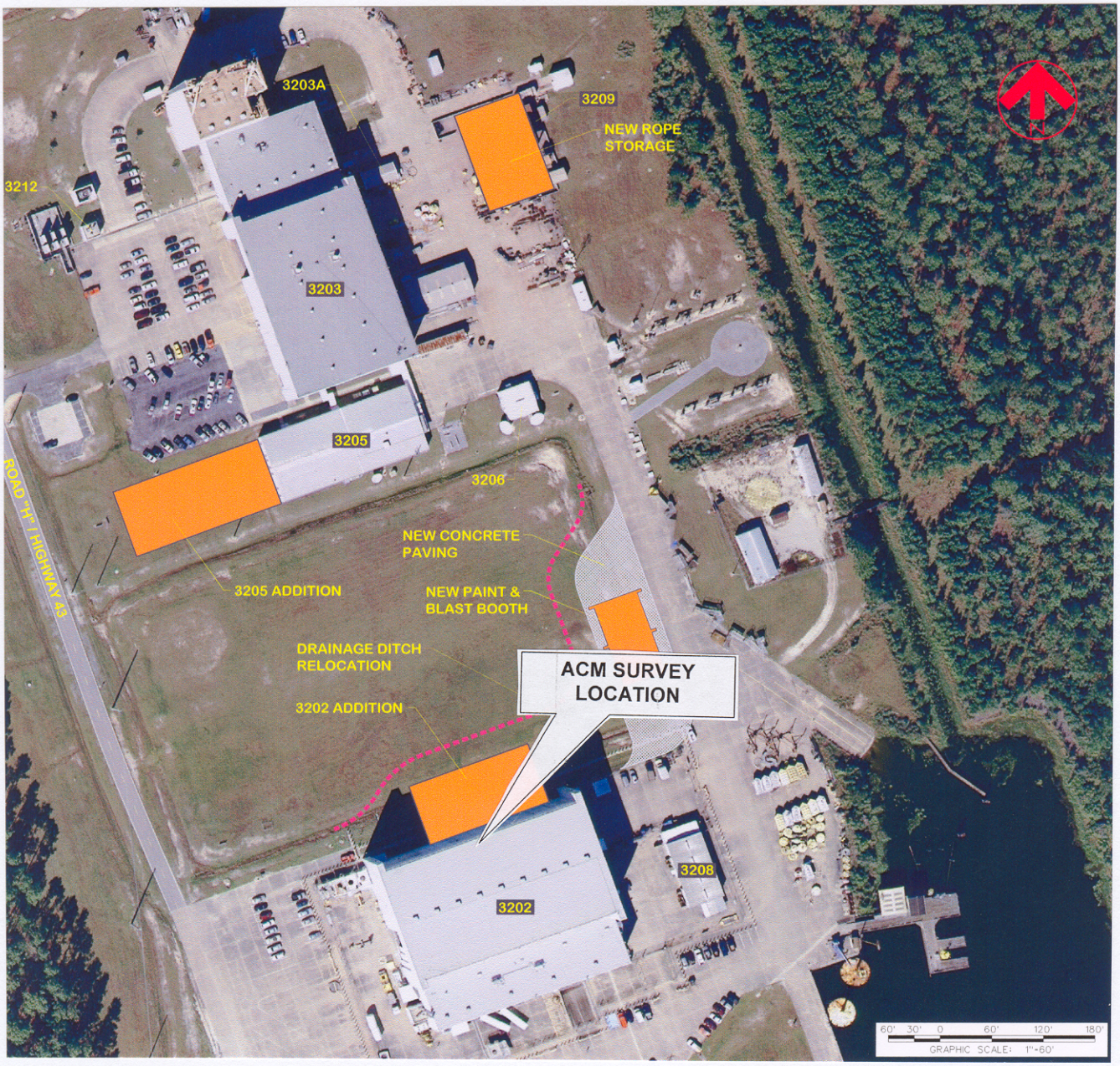
Appendix A Personnel Accreditation Certificates
Appendix B Laboratory Analysis Reports for ACM Survey Conducted by BAT Associates, Inc. (May 2008)

1.0 INTRODUCTION

BAT Associates, Inc. (BAT) was contracted by Mason and Hanger, Inc. to perform a pre-demolition/renovation asbestos-containing material (ACM) survey of Building 3202 located at the Stennis Space Center in Mississippi. The purpose of this survey was to identify ACM prior to planned demolition and renovation activities to the north side of the building. This survey was limited to only the north side of Building 3202 and was limited to a vertical access height above the finished floor. Any materials above this height that will come in contact with the renovation activities will need to be further assessed.

BAT performed an asbestos inspection of the structures to identify ACM that would require removal prior to demolition/renovation activities. This inspection identified no materials containing asbestos in a concentration greater that one percent.

Figure 1 shows the location of the subject structure.



BAT

BAT Associates, Inc.

ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 05-27-08
DWN. HG
APPR. CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3202
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 1
SITE LAYOUT MAP

2.0 INSPECTION FOR ASBESTOS-CONTAINING MATERIALS

2.1 Purpose

The purpose for this ACM inspection was to identify and quantify materials to be removed prior to scheduled demolition/renovation activities. In accordance with National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR 61-Subpart M, paragraph 145, all ACM, including regulated, Category I, and Category II non-friable ACM, must be identified and removed prior to demolition and renovation.

2.2 Inspection for Asbestos-Containing Materials

The ACM identification survey was performed on May 5, 2008 by Mr. Craig M. Aurin, an accredited inspector in accordance with the Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA) and the State of Mississippi (Certification No. I-011498). Accreditation certificates for Mr. Aurin are provided in Appendix A.

The ACM survey included a visual inspection of all areas of the structures, including the interior and exterior. Destructive testing was permitted and performed to verify the existence and extent of ACM. The inspection was performed in accordance with AHERA and ASHARA for interior sampling and the National Emission Standard for Hazardous Air Pollutants (NESHAP) for exterior sampling focusing on demolition requirements.

All suspect materials, or homogeneous areas (HAs), were visually identified. Typical HAs identified, sampled, and analyzed included: thermal system insulation (TSI) and building insulation.

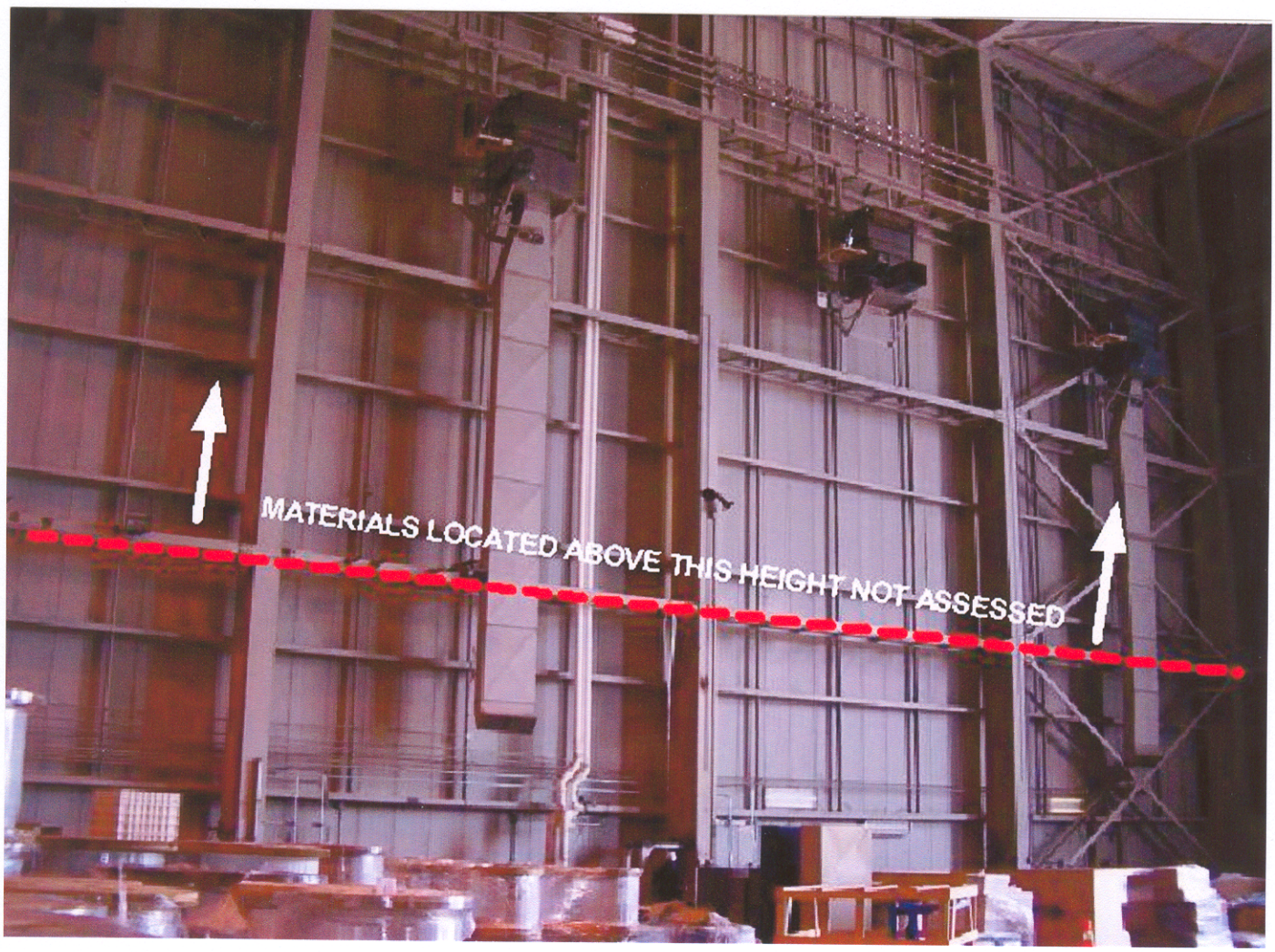
The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining techniques in accordance with EPA Method EPA/600/R-93/116 of July 1993. The samples were received by Analytical Environmental Services, Inc. (AES) on May 9, 2008. AES is accredited by the National Institute of Standards and Technology, and is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP).

In accordance with AHERA protocols, all samples within a HA must have an asbestos content of one percent or less by weight, using PLM analysis, before the material can be categorized as non-asbestos-containing. If one sample is determined as asbestos-containing the entire homogeneous area must be classified asbestos-containing.

2.2.1 Building 3202

Building 3202 is a large metal framed warehouse with a concrete floor. The survey was limited to the north side of the building, which is where the planned renovation is to take place. Due to height limitations, BAT was unable to assess the HVAC units and piping located on the upper half of the north interior wall (see Figure 2). Renovation activities are not expected to disturb this area.

Five HAs were identified (see Table 1) and 19 samples were analyzed (Appendix B). Laboratory analysis identified no materials containing asbestos in a concentration greater that one percent in any of the samples analyzed by PLM. One material (HA 3202-01; water line



BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 00-00-00
DWN. HG
APPR. CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3202
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 2
AREA NOT ASSESSED DURING SURVEY

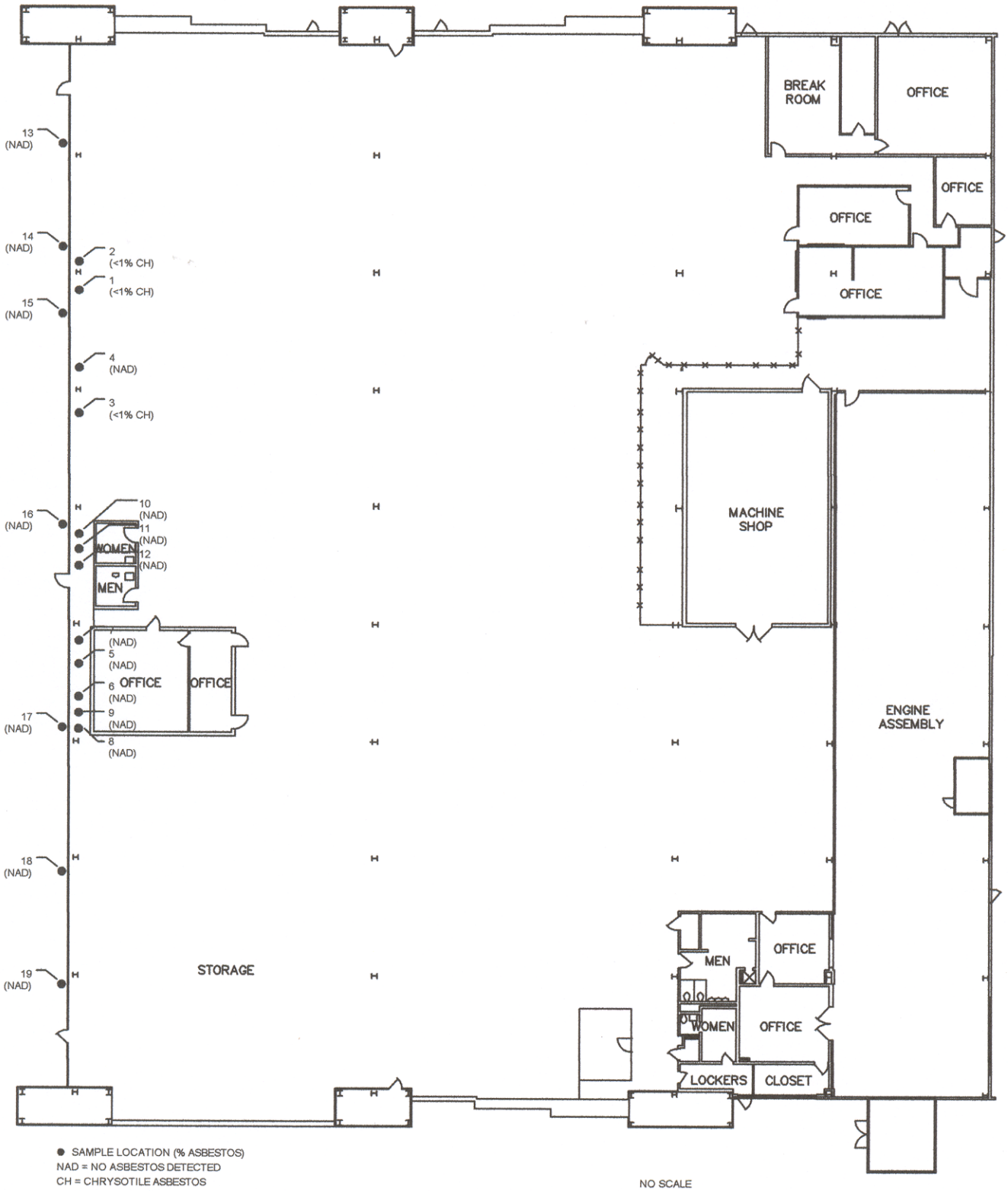
TSI covering) exhibited a PLM result of <1%. This material was re-analyzed and verified using transmission electron microscopy (TEM) to conclusively determine the presence and concentration of asbestos in this material (see Appendix B). TEM analysis confirmed that this material contains <1% chrysotile asbestos.

Sample locations are shown in Figure 3.

TABLE 1. HOMOGENOUS AREA (HA) LIST; BUILDING 3202 AREA

HA NUMBER	HA DESCRIPTION	LOCATION	RESULT
3202-01	Water Line TSI Covering	North Interior Wall	<1% CH
3202-02	CHW TSI	North Interior Wall	NAD
3202-03	CHW TSI Covering	North Interior Wall	NAD
3202-04	2" Dia. Water Line TSI	North Interior Wall	NAD
3202-05	North Wall Insulation	North Interior/Exterior Wall	NAD

TSI = Thermal System Insulation.
NAD = No Asbestos Detected.
CH = Chrysotile Asbestos.



BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 00-00-00
DWN. HG
APPR.CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3202
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 3
SAMPLE LOCATIONS

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Asbestos-Containing Materials

Based on the analytical results, no asbestos-containing materials in a concentration greater than one percent are present in areas that could be accessed on the north wall of Building 3202. Therefore, no material will require removal prior to renovation activities in regards to asbestos.

Due to height limitations, BAT was unable to assess the HVAC units and piping located on the upper half of the north interior wall. Renovation activities are not expected to disturb this area. Any materials above this height that will come in contact with the renovation activities will need to be further assessed prior to disturbance of those materials.

APPENDIX A

PERSONNEL ACCREDITATION CERTIFICATES

M·E·T·A

Mayhew Environmental Training Associates

INCORPORATED

Certificate # 7ME11020702AIR0033

This is to certify that

Craig Aurin

has on 11/02/2007, in Nashville, TN
completed the requirements for asbestos accreditation under Section 206 of TSCA Title II, 15 U.S.C. 2646

AHERA Asbestos Building Inspector Refresher Course

as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)
on 11/02/2007 - 11/02/2007 and passed the associated examination on 11/02/2007
with a score of 70% or better
CM = 0.50 Pts.

KANSAS MAYHEW INC. 1987 EST. 1985 ENVIRONMENTAL TRAINING ASSOCIATES SAFETY IN GOD ALONE

Instructor
Ronald Francis

Accreditation Expires: 11/2/08

President
Thomas Bradford Mayhew

M E T A - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

The State of Mississippi

Department of Environmental Quality

Certificate

In accordance with the Asbestos Abatement Accreditation and Certification Act, enacted as 1989 Mississippi Law, Ch. 505,

Be it known that

Craig M Aurin

having submitted acceptable evidence of qualifications and training and other appropriate information, is hereby granted

Inspector

certification.

Certificate No. **I-011498**

Expires **November 02, 2008**

Training Expires on November 02, 2008

Jimmie S. Ashwill

CHIEF, CERTIFICATION BRANCH

APPENDIX B

LABORATORY ANALYSIS REPORTS FOR ACM SURVEY CONDUCTED BY BAT ASSOCIATES, INC. (MAY 2008)

0805572

BAT ASSOCIATES, INC.
Chain-of-Custody PAGE 1 OF 3 Nº 384

Project #	Project Name/Location												
081005-01	STENNIS SPACE CTR - BLDG 3202												
Samplers: (signature)													
Station #	Date	Time	Comp	Grab	Station Location	No. of Containers	PLM						REMARKS
	5/5/08			X	3202-01-01	1	X						WATER TSI COVERING
					3202-01-02								"
					3202-01-03								"
					3202-02-04								CHW TSI
					3202-02-05								"
					3202-02-06								"
					3202-03-07								CHW TSI COVERING
					3202-03-08								"
					3202-03-09								"

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	12:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:	
				5/9/08	9:25	FEDEX	

Distribution: Original Accompanies Shipment. Copy returned with Report.

0805572

BAT ASSOCIATES, INC.
Chain-of-Custody

PAGE 2 OF 3 Nº 385

Project #	Project Name/Location												
081005-01	STENNIS SPACE CTR - BLDG 3202												
Samplers: (signature)													
Station #	Date	Time	Comp	Grab	Station Location	No. of Containers	PCM						REMARKS
	5/4/08			X	3202-04-10	1	X						2" DIA WATER TSI
					3202-04-11								"
					3202-04-12								"
					3202-05-13								EXTERIOR WALL INSULATION
					3202-05-14								"
					3202-05-15								"
					3202-05-16								"
					3202-05-17								"
				V	3202-05-18								"

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	12:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)

Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:
				5/9/08	9:25	FEDEX

Distribution: Original Accompanies Shipment. Copy returned with Report.

0805572

BAT ASSOCIATES, INC.
Chain-of-Custody

PAGE 3 OF 3 Nº 386

Project #	Project Name/Location												
081005-01	STENNIS SPACE CTR – BLDG 3202												
Samplers: (signature)													
Station #	Date	Time	Comp	Grab	Station Location	No. of Containers	Parameters: X PLM						REMARKS
	5/5/08			X	3202-05-19	1	X						EXTERIOR WALL INSULATION

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	12:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)

Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:
			Pelika T	5/9/08	9:25	FEDEX

Distribution: Original Accompanies Shipment. Copy returned with Report.

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3202**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805572**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3202-01-01 Layer: 1	0805572-001A	Water TSI Covering	<1	ND	ND	ND	ND	ND	Paint included as binder
3202-01-01 Layer: 2	0805572-001A	Water TSI Covering	ND	ND	ND	ND	ND	ND	
3202-01-01 Layer: 3	0805572-001A	Water TSI Covering	ND	ND	ND	ND	ND	ND	
3202-01-02 Layer: 1	0805572-002A	Water TSI Covering	<1	ND	ND	ND	ND	ND	Paint included as binder
3202-01-02 Layer: 2	0805572-002A	Water TSI Covering	ND	ND	ND	ND	ND	ND	
3202-01-03 Layer: 1	0805572-003A	Water TSI Covering	<1	ND	ND	ND	ND	ND	Paint included as binder
3202-01-03 Layer: 2	0805572-003A	Water TSI Covering	ND	ND	ND	ND	ND	ND	
3202-01-03 Layer: 3	0805572-003A	Water TSI Covering	ND	ND	ND	ND	ND	ND	
3202-02-04 Layer: 1	0805572-004A	CHW TSI	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

It is certified by the signatures below that the laboratory identified is accredited by the National Institute of Standards and Technology for Polarized Light Microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Quality Assurance Program, Laboratory ID 102082-0. All percentages given are by visually estimated volume. All analyses are performed in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, July 1993." This report must not be reproduced except in full without the approval of Analytical Environmental Service, Inc. These test results apply only to the samples actually tested.

Microanalyst: Yelena Khanina

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3202**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805572**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3202-02-05 Layer: 1	0805572-005A	CHW TSI	ND	ND	ND	ND	ND	ND	Insufficient amount of bitumen to be analyzed
3202-02-06 Layer: 1	0805572-006A	CHW TSI	ND	ND	ND	ND	ND	ND	Insufficient amount of bitumen to be analyzed
3202-03-07 Layer: 1	0805572-007A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-03-07 Layer: 2	0805572-007A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-03-08 Layer: 1	0805572-008A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-03-08 Layer: 2	0805572-008A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-03-09 Layer: 1	0805572-009A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-03-09 Layer: 2	0805572-009A	CHW TSI Covering	ND	ND	ND	ND	ND	ND	
3202-04-10 Layer: 1	0805572-010A	2" Dia Water TSI	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

It is certified by the signatures below that the laboratory identified is accredited by the National Institute of Standards and Technology for Polarized Light Microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Quality Assurance Program, Laboratory ID 102082-0. All percentages given are by visually estimated volume. All analyses are performed in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, July 1993." This report must not be reproduced except in full without the approval of Analytical Environmental Service, Inc. These test results apply only to the samples actually tested.

Microanalyst: Yelena Khanina

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3202**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805572**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3202-04-11 Layer: 1	0805572-011A	2" Dia Water TSI	ND	ND	ND	ND	ND	ND	
3202-04-12 Layer: 1	0805572-012A	2" Dia Water TSI	ND	ND	ND	ND	ND	ND	
3202-05-13 Layer: 1	0805572-013A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-14 Layer: 1	0805572-014A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-15 Layer: 1	0805572-015A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-16 Layer: 1	0805572-016A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-17 Layer: 1	0805572-017A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-18 Layer: 1	0805572-018A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3202-05-19 Layer: 1	0805572-019A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

It is certified by the signatures below that the laboratory identified is accredited by the National Institute of Standards and Technology for Polarized Light Microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Quality Assurance Program, Laboratory ID 102082-0. All percentages given are by visually estimated volume. All analyses are performed in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, July 1993." This report must not be reproduced except in full without the approval of Analytical Environmental Service, Inc. These test results apply only to the samples actually tested.

Microanalyst: Yelena Khanina

QC Analyst: Yelena Khanina

Date: 5/19/08 AES Project ID: S18243

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.
Transmission Electron Microscopy
Semi-Quantitative Analysis Summary Report

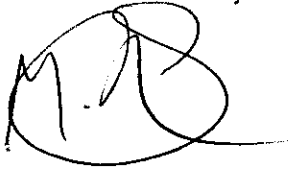
NVLAP

Company Name: BAT Associates (Oak Ridge)
Project Name: STENNIS SPACE CTR-BLDG 3202
Attention:

TEM ID	Client Sample ID	Location	SemiQuant Results (in Weight %)*				
			Ch	Am	Cr	Oth	Total
15050	3202-01-01		<1.0%	NAD	NAD	NAD	<1.0%
15051	3202-01-02		<1.0%	NAD	NAD	NAD	<1.0%
15052	3202-01-03		<1.0%	NAD	NAD	NAD	<1.0%

These test results apply only to those samples actually tested, as submitted by the client.These samples have been analyzed using a Phillips 400T transmission electron microscope equipped with a Tracor Northern energy dispersive X-ray spectrometer. The semi-quantitative method used for this analysis sometimes is referred to as drop mount or Modified Chattfiled and is developed by AES TEM laboratory. This method is similar to EPA 60/R93/116 Section 2.5.5.1 "AEM Specimen Preparation for Semi-Quantitative Evaluation of Bulk Samples". A copy of the method used will be provided upon request. It is certified by the signature below that Analytical Environmental Services, Inc. is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program, Lab No. 102082-0 for Airborne Asbestos Fiber Analysis only.

Mort Soltani, TEM Analyst:



BAT

BAT ASSOCIATES, INC.

COMPLETION REPORT

PRE-DEMOLITION/RENOVATION ASBESTOS SURVEY
BUILDING 3205
STENNIS SPACE CENTER, MS



PREPARED FOR:

MASON AND HANGER, INC.
300 WEST VINE STREET, SUITE 1300
LEXINGTON, KY 40507-1814

PREPARED BY:

BAT ASSOCIATES, INC.
5151 BROOK HOLLOW PARKWAY, SUITE 250
NORCROSS, GA 30071

JUNE 5, 2008

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2.0 INSPECTION FOR ASBESTOS-CONTAINING MATERIALS 3
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Figure 2 Areas Scheduled for Renovation/Demolition 4
Figure 3 Sample Locations 6

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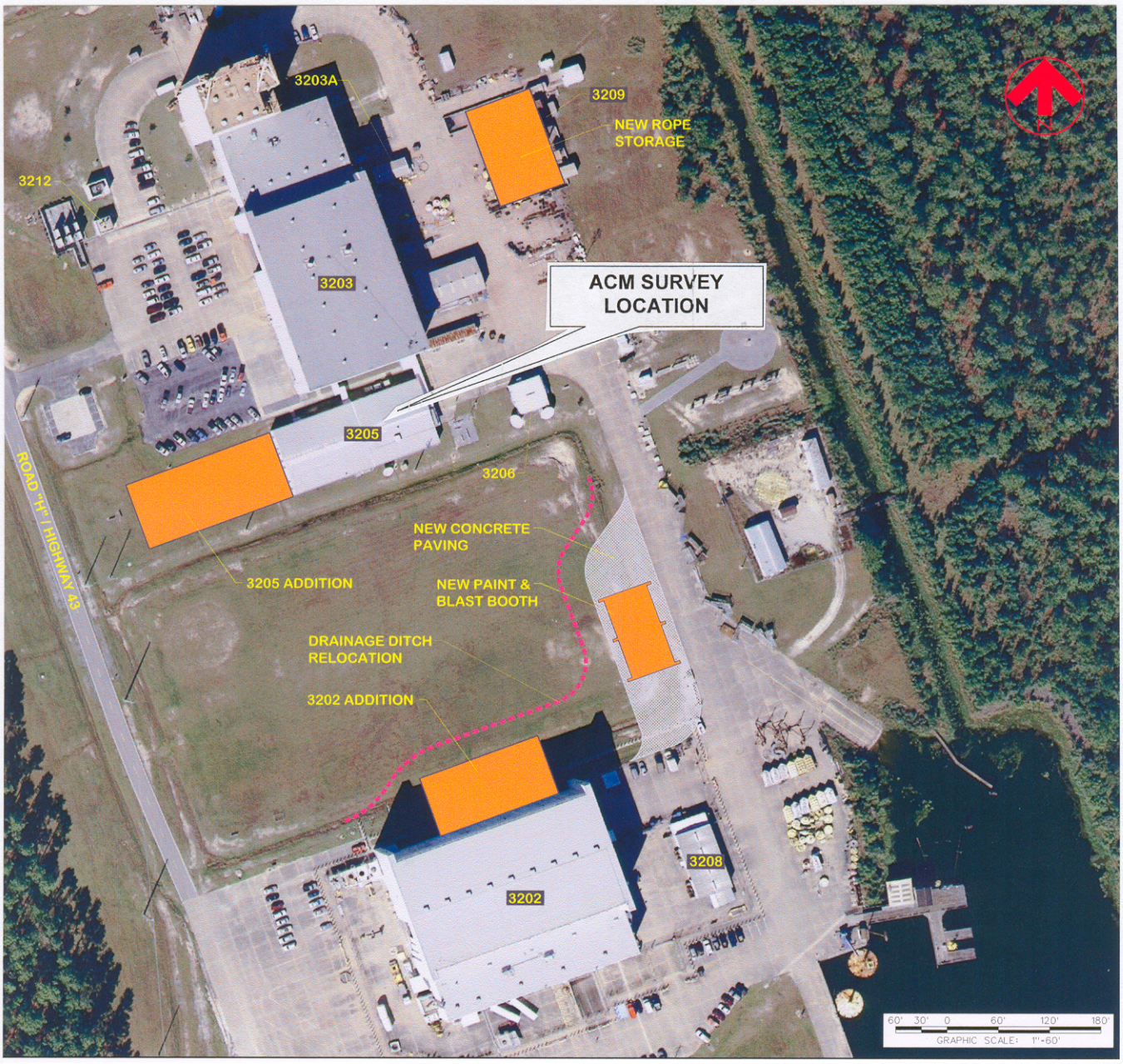
Appendix A Personnel Accreditation Certificates
Appendix B Laboratory Analysis Reports for ACM Survey Conducted by BAT Associates, Inc. (May 2008)
Appendix C Photographic Documentation of Asbestos-Containing Materials Identified
Appendix D Asbestos Removal Estimate

1.0 INTRODUCTION

BAT Associates, Inc. (BAT) was contracted by Mason and Hanger, Inc. to perform a pre-demolition/renovation asbestos-containing material (ACM) survey of Building 3205 located at the Stennis Space Center in Mississippi. The purpose of this survey was to identify ACM prior to planned renovation activities to selective areas of the interior and to the west side of the building. This survey was limited to only the areas that could be affected by the planned renovations.

BAT performed an asbestos inspection of the structure to identify ACM that would require removal prior to demolition/renovation activities. This inspection identified one material (12-inch x 12-inch beige vinyl floor tile) that contains asbestos in a concentration greater that one percent.

Figure 1 shows the location of the subject structure.



BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 05-27-08
DWN. HG
APPR.CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3205
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 1
SITE LAYOUT MAP

2.0 INSPECTION FOR ASBESTOS-CONTAINING MATERIALS

2.1 Purpose

The purpose for this ACM inspection was to identify and quantify materials to be removed prior to scheduled demolition/renovation activities. In accordance with National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR 61-Subpart M, paragraph 145, all ACM, including regulated, Category I, and Category II non-friable ACM, must be identified and removed prior to demolition and renovation.

2.2 Inspection for Asbestos-Containing Materials

The ACM identification survey was performed on May 5, 2008 by Mr. Craig M. Aurin, an accredited inspector in accordance with the Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA) and the State of Mississippi (Certification No. I-011498). Accreditation certificates for Mr. Aurin are provided in Appendix A.

The ACM survey included a visual inspection of all areas of the structures, including the interior and exterior. Destructive testing was permitted and performed to verify the existence and extent of ACM. The inspection was performed in accordance with AHERA and ASHARA for interior sampling and the National Emission Standard for Hazardous Air Pollutants (NESHAP) for exterior sampling focusing on demolition requirements.

All suspect materials, or homogeneous areas (HAs), were visually identified. Typical HAs identified, sampled, and analyzed included: ceiling tiles, flooring materials, drywall, drywall joint compound, caulking and wall insulation.

The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining techniques in accordance with EPA Method EPA/600/R-93/116 of July 1993. The samples were received by Analytical Environmental Services, Inc. (AES) on May 9, 2008. AES is accredited by the National Institute of Standards and Technology, and is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP).

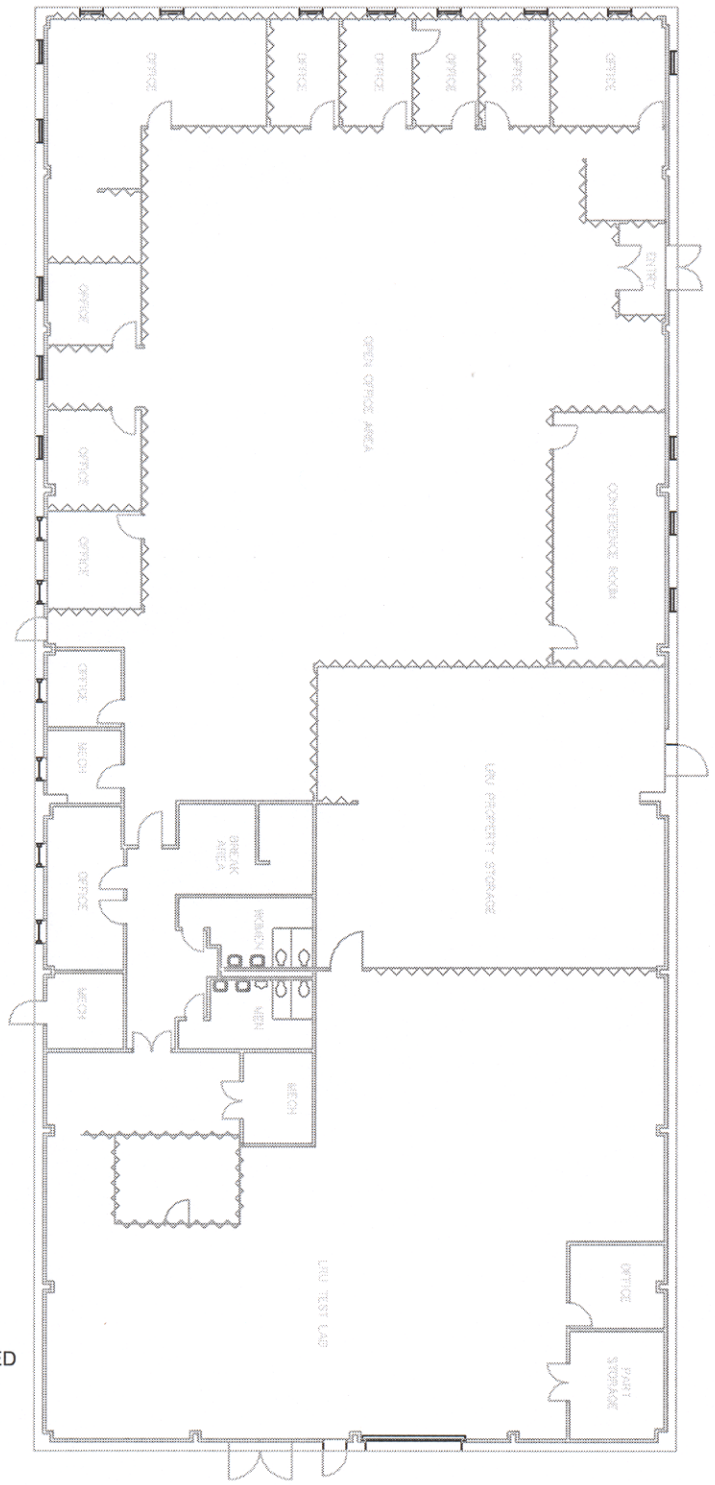
In accordance with AHERA protocols, all samples within a HA must have an asbestos content of one percent or less by weight, using PLM analysis, before the material can be categorized as non-asbestos-containing. If one sample is determined as asbestos-containing the entire homogeneous area must be classified asbestos-containing.

2.2.1 Building 3205

Building 3205 is a pre-fabricated metal structure on a concrete slab. It currently houses offices and a testing laboratory. The survey was limited only to the areas scheduled for renovation activities (see Figure 2).

Eight HAs were identified (see Table 1) and 41 samples were analyzed (Appendix B). Laboratory analysis identified no materials containing asbestos in a concentration greater that one percent in any of the samples analyzed by PLM. One material (HA 3205-03; beige 12-inch x 12-inch vinyl floor tile) exhibited a PLM result of <1%. This material was re-analyzed and verified using transmission electron microscopy (TEM) to conclusively deter-

NORTH



LEGEND

PLANNED DEMOLITION

NOTE: ALL CEILINGS TO BE REMOVED

NO SCALE

BAT

BAT Associates, Inc.

ENVIRONMENTAL, HEALTH, SAFETY SERVICES

181 Lafayette Drive

Oak Ridge, Tennessee 37830

DATE 00-00-00

DWN. HG

APPR. CMA

REVIS.

PROJECT NO.

081005.01

ASBESTOS SURVEY - BUILDING 3205

NDBC RENOVATION AND EXPANSION

STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 2

AREAS SCHEDULED FOR RENOVATION/DEMOLITION

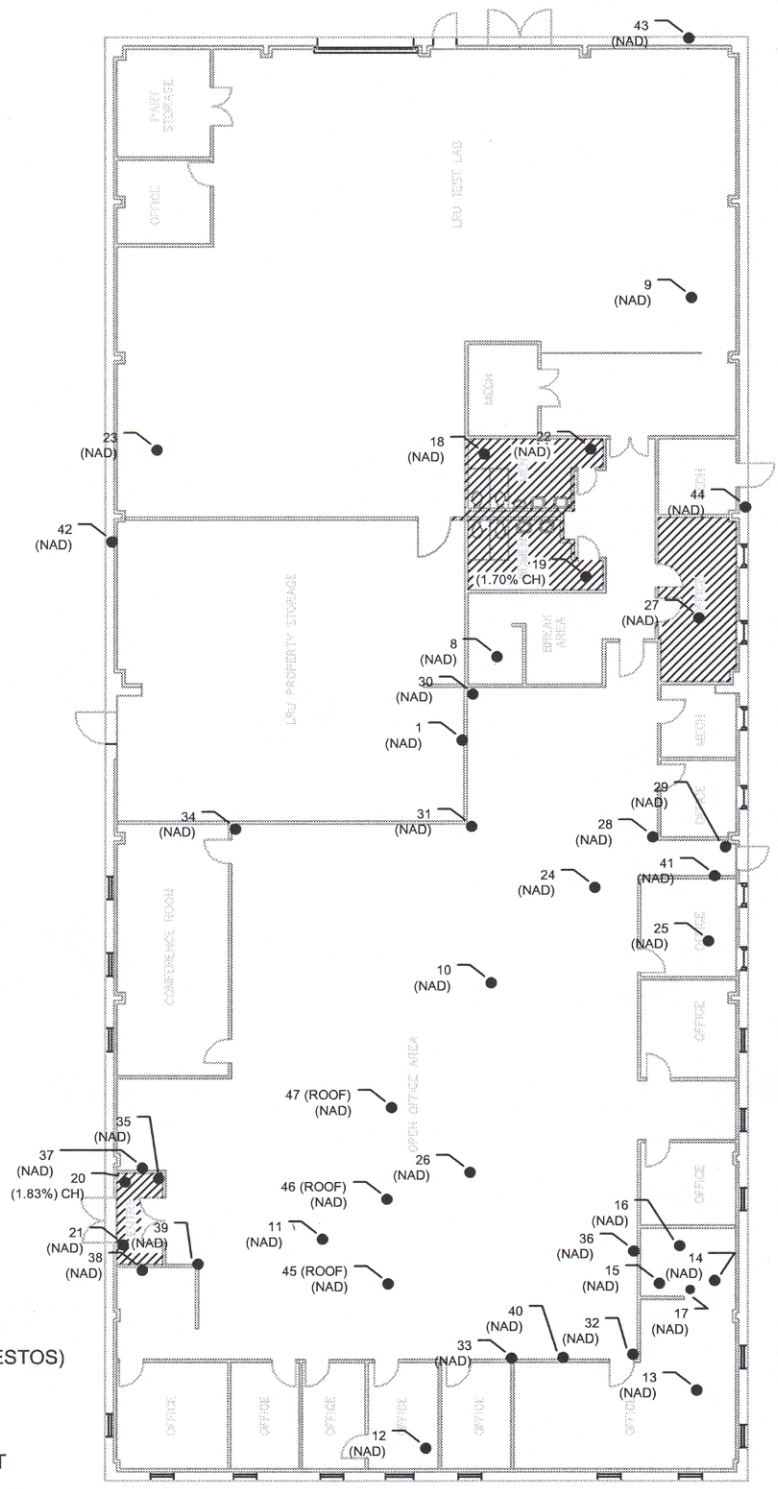
mine the presence and concentration of asbestos in this material. TEM analysis revealed that this material contains chrysotile asbestos ranging from 1.70 percent and 1.83 percent (see Appendix B).

Sample locations are shown in Figure 3. Photographic documentation of asbestos-containing material identified is provided in Appendix C.

TABLE 1. HOMOGENOUS AREA (HA) LIST; BUILDING 3205

HA NUMBER	HA DESCRIPTION	LOCATION	RESULT	CONDITION	ESTIMATED QUANTITY
3205-01	Drywall	Interior Office Walls	NAD	Good	N/A
3205-02	Drywall Joint Compound	Interior Office Walls	NAD	Good	N/A
3205-03	**Beige 12-inch x 12-inch Vinyl Floor Tile**	**Entry, Restrooms, South Office (under carpet)**	**1.70 – 1.83% CH**	**Good Category I Non-friable**	**680 SF**
3205-04	2' x 4' Ceiling Tile – Cut Pattern	All Interior Ceilings	NAD	Good	N/A
3205-05	Grey 12-inch x 12-inch Vinyl Floor Tile	Southwest Office	NAD	Good	N/A
3205-06	2' x 4' Ceiling Tile – Hole Pattern	All Interior Ceilings (Various Locations	NAD	Good	N/A
3205-07	Exterior Wall Insulation	Exterior Walls	NAD	Good	N/A
3205-08	Roof Ridge Caulking	Roof	NAD	Good	N/A

CH = Chrysotile Asbestos.
NAD = No Asbestos Detected.
N/A = Not applicable.
SF = Square Feet.



LEGEND

- ● SAMPLE LOCATION (% ASBESTOS)
- NAD NO ASBESTOS DETECTED
- CH CHRYSOTILE ASBESTOS
- VFT VINYL FLOOR TILE
- ▨ ASBESTOS CONTAINING VFT

NO SCALE

BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 00-00-00
DWN. HG
APPR.CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3205
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 3
SAMPLE LOCATIONS

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Asbestos-Containing Materials

Based on the analytical results, one HA (3205-03, beige 12-inch x 12-inch vinyl floor tile) contains a concentration of chrysotile asbestos greater than one percent. Should the planned activities cause this material to be disturbed, this material will require proper removal and disposal as ACM prior to renovation.

An estimated cost to remove the ACM vinyl floor tile is provided in Appendix D.

APPENDIX A

PERSONNEL ACCREDITATION CERTIFICATES

M·E·T·A

Mayhew Environmental Training Associates

INCORPORATED

Certificate # 7ME11020702AIR0033

This is to certify that

Craig Aurin

has on 11/02/2007, in Nashville, TN
completed the requirements for asbestos accreditation under Section 206 of TSCA Title II, 15 U.S.C. 2646

AHERA Asbestos Building Inspector Refresher Course

as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)
on 11/02/2007 - 11/02/2007 and passed the associated examination on 11/02/2007
with a score of 70% or better
CM = 0.50 Pts.

KANSAS MAYHEW INC. 1987 EST. 1985 ENVIRONMENTAL TRAINING ASSOCIATES SAFETY IN GOD ALONE

Instructor
Ronald Francis

Accreditation Expires: 11/2/08

President
Thomas Bradford Mayhew

M E T A - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

The State of Mississippi

Department of Environmental Quality

Certificate

In accordance with the Asbestos Abatement Accreditation and Certification Act, enacted as 1989 Mississippi Law, Ch. 505,

Be it known that

Craig M Aurin

having submitted acceptable evidence of qualifications and training and other appropriate information, is hereby granted

Inspector

certification.

Certificate No. **I-011498**

Expires **November 02, 2008**

Training Expires on November 02, 2008

Jimmie S. Ashwill

CHIEF, CERTIFICATION BRANCH

APPENDIX B

LABORATORY ANALYSIS REPORTS FOR ACM SURVEY CONDUCTED BY BAT ASSOCIATES, INC. (MAY 2008)

0805618

BAT ASSOCIATES, INC.
Chain-of-Custody

PAGE 1 OF 5 Nº 454

Project #	Project Name/Location													
081005-01	STENNIS SPACE CTR - BLDG 3205													
Samplers: (signature)														
Station #	**Date**	**Time**	**Comp**	**Grab**	**Station Location**	**No. of Containers**	**Parameters**							**REMARKS**
							PLM							
	5/5/08			X	3202-01-01	1	X							DRYWALL
					3202-01-35									"
					3202-01-36									"
					3202-01-37									"
					3202-01-38									"
					3202-01-39									"
					3202-01-40									"
					3202-01-41									"
					3202-02-28									DRYWALL JOINT COMPOUND

Relinquished by: *(signature)*	Date	Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date	Time	Received by: *(Signature)*
	5/7/08	13:50					
Relinquished by: *(signature)*	**Date**	**Time**	**Received by:** *(Signature)*	**Relinquished by:** *(Signature)*	**Date**	**Time**	**Received by:** *(Signature)*

Relinquished by: *(signature)*	Date	Time	Received for laboratory by: *(Signature)*	Date	Time	Remarks:
				5/9/08	9:25	FEDEX

Distribution: Original Accompanies Shipment. Copy returned with Report.

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BAT ASSOCIATES, INC.
Chain-of-Custody

PAGE 2 OF 5 Nº 455

Project #	Project Name/Location												
081005-01	STENNIS SPACE CTR - BLDG 3205												
Samplers: (signature)													
Station #	Date	Time	Comp	Grab	Station Location	No. of Containers	Parameters: PLM						REMARKS
	5/5/08		/	X	3205-02-29	1	X						DRYWALL JOINT COMPOUND
					3205-02-30								"
					3205-02-31								"
					3205-02-32								"
					3205-02-33								"
					3205-02-34								"
					3205-03-18								BENCH 12X12 VFT *
					3205-03-19								" *
					3205-03-20								" *

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	13:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:	
			Pluka Tan	5/9/08	9:25	RUN TEM IF PLM RESULT IS < 1% ON SAMPLES 18, 19, 20, 21, 22 FOR VERIFICATION	

Distribution: Original Accompanies Shipment. Copy returned with Report.

FEDEX

Form #93-09

JULY 1993

0805618

BAT ASSOCIATES, INC.
Chain-of-Custody PAGE 3 OF 5 Nº 456

Project #	Project Name/Location					No. of Containers	Parameters						REMARKS
081005-01	STENNIS SPACE CTR - BLDG 3205						PLM						
Samplers: (signature)													
Station #	Date	Time	Comp	Grab	Station Location								
	5/5/08			X	3205-03-21	1	X						BEIGH 12X12 VFT *
					3205-03-22								" *
					3205-04-08								2X4 CEILING TILE CUT PATTERN
					3205-04-09								"
					3205-04-10								"
					3205-04-11								"
					3205-04-12								"
					3205-04-13								"
					3205-04-14								"

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	13:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)

Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:
			Pamela Tr	5/9/08	9:25	FEDEX

Distribution: Original Accompanies Shipment. Copy returned with Report.

Form #93-09

JULY 1993

BAT ASSOCIATES, INC.
Chain-of-Custody

PAGE 4 OF 5

0805618

Nº 457

Project #	Project Name/Location												
081005-01	SPENNIS SPACE CTR – BLDG 3205												
Samplers: (signature)						No. of Containers	Parameters						
Station #	Date	Time	Comp	Grab	Station Location		PLM						REMARKS
	5/5/08			X	3205-06-23	1	X						2X4 CEILING TILE HOLE PATTERN
					3205-06-24								"
					3205-06-25								"
					3205-06-26								"
					3205-06-27								"
					3205-05-15								12X12 VFT GREY *
					3205-05-16								" *
					3205-~~06~~ 05-17								" *
					3205-07-42								EXTERIOR WALL INSULATION

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	13:50					
Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:	
			Pluka Tr	5/9/08	9:25	* RUN TEM IF PLM RESULT IS <1% ON SAMPLES 15,16,17 FOR VERIFICATION	

FEDEX

Distribution: Original Accompanies Shipment. Copy returned with Report.

0805618

BAT ASSOCIATES, INC.
Chain-of-Custody PAGE 5 OF 5 **Nº 458**

| Project # | Project Name/Location | | |

Analytical Environmental Services, Inc.
Sample Receipt Checklist

CompanyName: Bat Associates Inc

AES Job Number 0805818 Date Received: 5/9/08 Time Received: 9:25 (AM) PM

Project Description:

Carrier Name: Fed-Ex

Checklist Completed By: [signature] 5/9/08 (Signature and Date) Reviewed By: [signature] 05/15/08 (Signature and Date)

Shipping container in good condition?	Yes ✓	No
Chain of custody present?	Yes ✓	No
Chain of custody signed when relinquished and received?	Yes ✓	No
Chain of custody agrees with sample labels?	Yes ✓	No
Samples in proper container/bottle?	Yes ✓	No
Sample containers intact?	Yes ✓	No
Sufficient sample volume for indicated test?	Yes ✓	No
(For Asbestos Only) Is a known field blank included?	Yes	No ✓

Sample Condition Good ✓ Other (Explain)

Any No and/or NA (Not Applicable) response must be detailed in the comments section below:

Client contacted Date contacted Person contacted

Contacted by Regarding

Comments

Corrective action

Analytical Environmental Services, Inc. **Date:** *22-May-08*

CLIENT: BAT Associates, Inc.
Project: STENNIS SPACE CTR-BLDG 3205
Lab Order: 0805618

CASE NARRATIVE

Per Craig Aurin on 5/22/08 via email, the prefix of each sample ID was changed from "3202" to "3205".

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-01-01 Layer: 1	0805618-001A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-01 Layer: 2	0805618-001A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-35 Layer: 1	0805618-002A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-35 Layer: 2	0805618-002A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-35 Layer: 3	0805618-002A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-35 Layer: 4	0805618-002A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-36 Layer: 1	0805618-003A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-01-36 Layer: 2	0805618-003A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-37 Layer: 1	0805618-004A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

It is certified by the signatures below that the laboratory identified is accredited by the National Institute of Standards and Technology for Polarized Light Microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Quality Assurance Program, Laboratory ID 102082-0. All percentages given are by visually estimated volume. All analyses are performed in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, July 1993." This report must not be reproduced except in full without the approval of Analytical Environmental Service, Inc. These test results apply only to the samples actually tested.

Microanalyst: Elena Ivanova

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-01-37 Layer: 2	0805618-004A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-38 Layer: 1	0805618-005A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-01-38 Layer: 2	0805618-005A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-38 Layer: 3	0805618-005A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-39 Layer: 1	0805618-006A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-01-39 Layer: 2	0805618-006A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-40 Layer: 1	0805618-007A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-01-40 Layer: 2	0805618-007A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-40 Layer: 3	0805618-007A	Drywall	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Elena Ivanova

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-01-41 Layer: 1	0805618-008A	Drywall	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-01-41 Layer: 2	0805618-008A	Drywall	ND	ND	ND	ND	ND	ND	
3205-01-41 Layer: 3	0805618-008A	Drywall	ND	ND	ND	ND	ND	ND	
3205-02-28 Layer: 1	0805618-009A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-28 Layer: 2	0805618-009A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-29 Layer: 1	0805618-010A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-29 Layer: 2	0805618-010A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-30 Layer: 1	0805618-011A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-30 Layer: 2	0805618-011A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Elena Ivanova

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-02-31 Layer: 1	0805618-012A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-31 Layer: 2	0805618-012A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-31 Layer: 3	0805618-012A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-32 Layer: 1	0805618-013A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-32 Layer: 2	0805618-013A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-32 Layer: 3	0805618-013A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-33 Layer: 1	0805618-014A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-33 Layer: 2	0805618-014A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-33 Layer: 3	0805618-014A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Elena Ivanova

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-02-34 Layer: 1	0805618-015A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-02-34 Layer: 2	0805618-015A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-02-34 Layer: 3	0805618-015A	Drywall Joint Compound	ND	ND	ND	ND	ND	ND	
3205-03-18 Layer: 1	0805618-016A	Beigh 12x12 VFT*	ND	ND	ND	ND	ND	ND	
3205-03-19 Layer: 1	0805618-017A	Beigh 12x12 VFT*	<1	ND	ND	ND	ND	ND	Tile
3205-03-19 Layer: 2	0805618-017A	Beigh 12x12 VFT*	ND	ND	ND	ND	ND	ND	Black Mastic
3205-03-20 Layer: 1	0805618-018A	Beigh 12x12 VFT*	<1	ND	ND	ND	ND	ND	Tile
3205-03-20 Layer: 2	0805618-018A	Beigh 12x12 VFT*	ND	ND	ND	ND	ND	ND	Black Mastic
3205-03-21 Layer: 1	0805618-019A	Beigh 12x12 VFT*	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Elena Ivanova

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-03-22 Layer: 1	0805618-020A	Beigh 12x12 VFT*	ND	ND	ND	ND	ND	ND	
3205-04-08 Layer: 1	0805618-021A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-09 Layer: 1	0805618-022A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-10 Layer: 1	0805618-023A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-11 Layer: 1	0805618-024A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-12 Layer: 1	0805618-025A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-13 Layer: 1	0805618-026A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-04-14 Layer: 1	0805618-027A	2X4 Ceiling Tile Cut Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-06-23 Layer: 1	0805618-028A	2X4 Ceiling Tile Hole Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Arkadiy Gendlin

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-06-24 Layer: 1	0805618-029A	2X4 Ceiling Tile Hole Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-06-25 Layer: 1	0805618-030A	2X4 Ceiling Tile Hole Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-06-26 Layer: 1	0805618-031A	2X4 Ceiling Tile Hole Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-06-27 Layer: 1	0805618-032A	2X4 Ceiling Tile Hole Pattern	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-05-15 Layer: 1	0805618-033A	12x12 VFT Grey *	ND	ND	ND	ND	ND	ND	
3205-05-16 Layer: 1	0805618-034A	12x12 VFT Grey *	ND	ND	ND	ND	ND	ND	
3205-05-17 Layer: 1	0805618-035A	12x12 VFT Grey *	ND	ND	ND	ND	ND	ND	
3205-07-42 Layer: 1	0805618-036A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Iron Oxide Included as binder
3205-07-43 Layer: 1	0805618-037A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Iron Oxide Included as binder

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
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Microanalyst: Arkadiy Gendlin

QC Analyst: Yelena Khanina

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3205**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805618**
Friday, May 16, 2008

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3205-07-44 Layer: 1	0805618-038A	Exterior Wall Insulation	ND	ND	ND	ND	ND	ND	Iron Oxide Included as binder
3205-08-45 Layer: 1	0805618-039A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-08-45 Layer: 2	0805618-039A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	
3205-08-46 Layer: 1	0805618-040A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-08-46 Layer: 2	0805618-040A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	
3205-08-47 Layer: 1	0805618-041A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	Paint included as binder
3205-08-47 Layer: 2	0805618-041A	Roof Ridge Caulk / Sealer	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

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Microanalyst: Arkadiy Gendlin

QC Analyst: Yelena Khanina

Date: 5/16/08 AES Project ID: S18241

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.
Transmission Electron Microscopy
Semi-Quantitative Analysis Summary Report

NVLAP

Company Name: BAT Associates (Oak Ridge)
Project Name: STENNIS SPACE CTR-BLDG 3205
Attention:

TEM ID	Client Sample ID	Location	SemiQuant Results (in Weight %)*				
			Ch	Am	Cr	Oth	Total
15047	3205-03-19		1.7035	NAD	NAD	NAD	1.70
15048	3205-03-20		1.8251	NAD	NAD	NAD	1.83

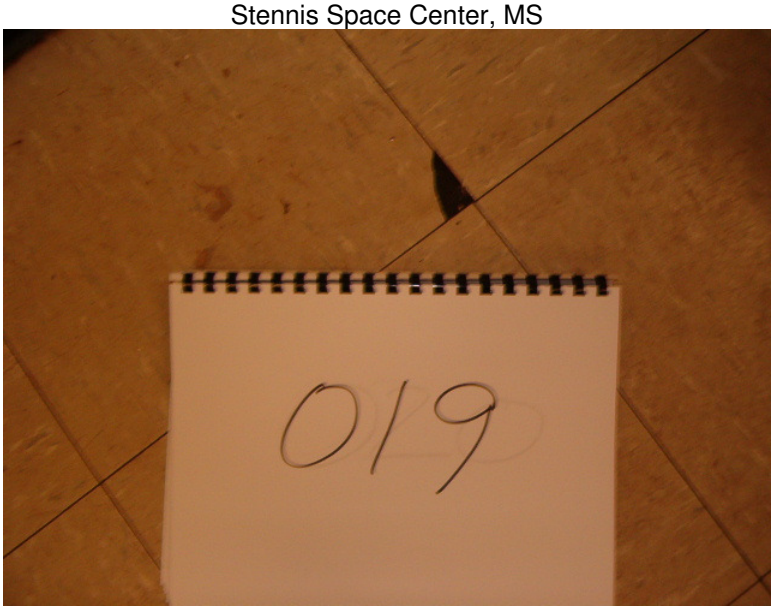
These test results apply only to those samples actually tested, as submitted by the client.These samples have been analyzed using a Phillips 400T transmission electron microscope equipped with a Tracor Northern energy dispersive X-ray spectrometer. The semi-quantitative method used for this analysis sometimes is referred to as drop mount or Modified Chattfiled and is developed by AES TEM laboratory. This method is similar to EPA 60/R93/116 Section 2.5.5.1 "AEM Specimen Preparation for Semi-Quantitative Evaluation of Bulk Samples". A copy of the method used will be provided upon request. It is certified by the signature below that Analytical Environmental Services, Inc. is accredited by the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program, Lab No. 102082-0 for Airborne Asbestos Fiber Analysis only.

Mort Soltani, TEM Analyst:

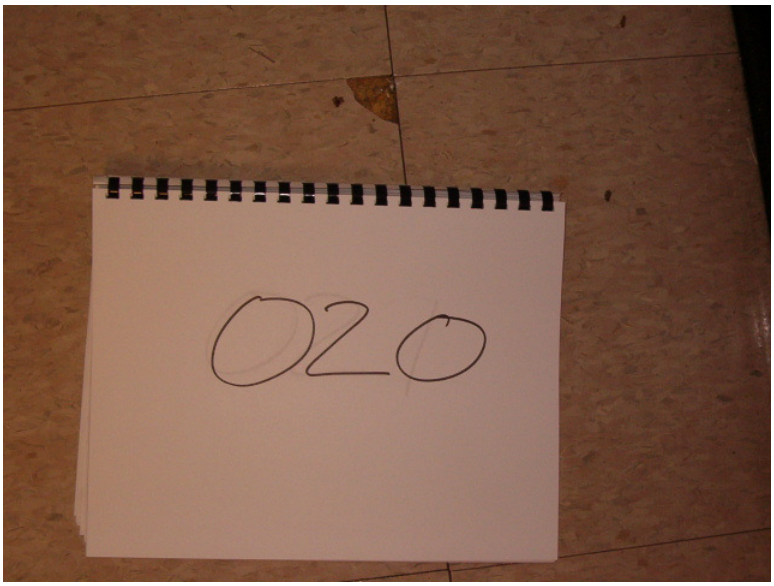
APPENDIX C

PHOTOGRAPHIC DOCUMENTATION OF ASBESTOS-CONTAINING MATERIAL IDENTIFIED

Asbestos-Containing Material Sample Location Photographs
Asbestos Survey – Building No. 3205
NDBC Renovation & Expansion
Stennis Space Center, MS



Sample No.	*HA No.*	*Homogenous Area Description*	*ACM Status*	*Sample Location*	*Sample Result*
19	3	Beige 12”x12” VFT	**ACM Category I Non-friable**	Women’s restroom	**1.70% CH***



Sample No.	*HA No.*	*Homogenous Area Description*	*ACM Status*	*Sample Location*	*Sample Result*
20	3	Beige 12”x12” VFT	**ACM Category I Non-friable**	Entry	**1.83% CH***

No Asbestos Detected (NAD), Chrysotile (CH), Asbestos Containing Material (ACM), Non-Asbestos Containing Material (Non-ACM), Ceiling Tile (CT), Vinyl Floor Tile (VFT)
* Verified by TEM Analysis.

APPENDIX D

ASBESTOS REMOVAL ESTIMATE

APPENDIX D

Pre-Demolition / Renovation Asbestos Survey
Building 3205
Stennis Space Center, MS

Remove and Dispose of Asbestos-Containing Vinyl Floor Tile

The primary resources used for this design are:
a. Vendor estimates

DESCRIPTION	QUANTITY	UNIT	UNIT COST	($) TOTAL	BASIS FOR COST
Asbestos Removal					
Remove asbestos-containing floor tile	680	SF	$7.00	$4,760	Vendor estimates
Asbestos Disposal					
Dispose of asbestos-containing floor tile	1	LS	$800	$800	Vendor estimates
Mobilization / Demobilization					
Mob / Demob	1	LS	$650	$650	Vendor estimates
TOTAL ESTIMATED PROJECT COST (AS OF JUNE 2008 DOLLARS):				**$6,210**	

BAT

BAT ASSOCIATES, INC.

COMPLETION REPORT

PRE-DEMOLITION/RENOVATION ASBESTOS SURVEY
BUILDING 3209 AREA
STENNIS SPACE CENTER, MS



PREPARED FOR:

MASON AND HANGER, INC.
300 WEST VINE STREET, SUITE 1300
LEXINGTON, KY 40507-1814

PREPARED BY:

BAT ASSOCIATES, INC.
5151 BROOK HOLLOW PARKWAY, SUITE 250
NORCROSS, GA 30071

JUNE 5, 2008

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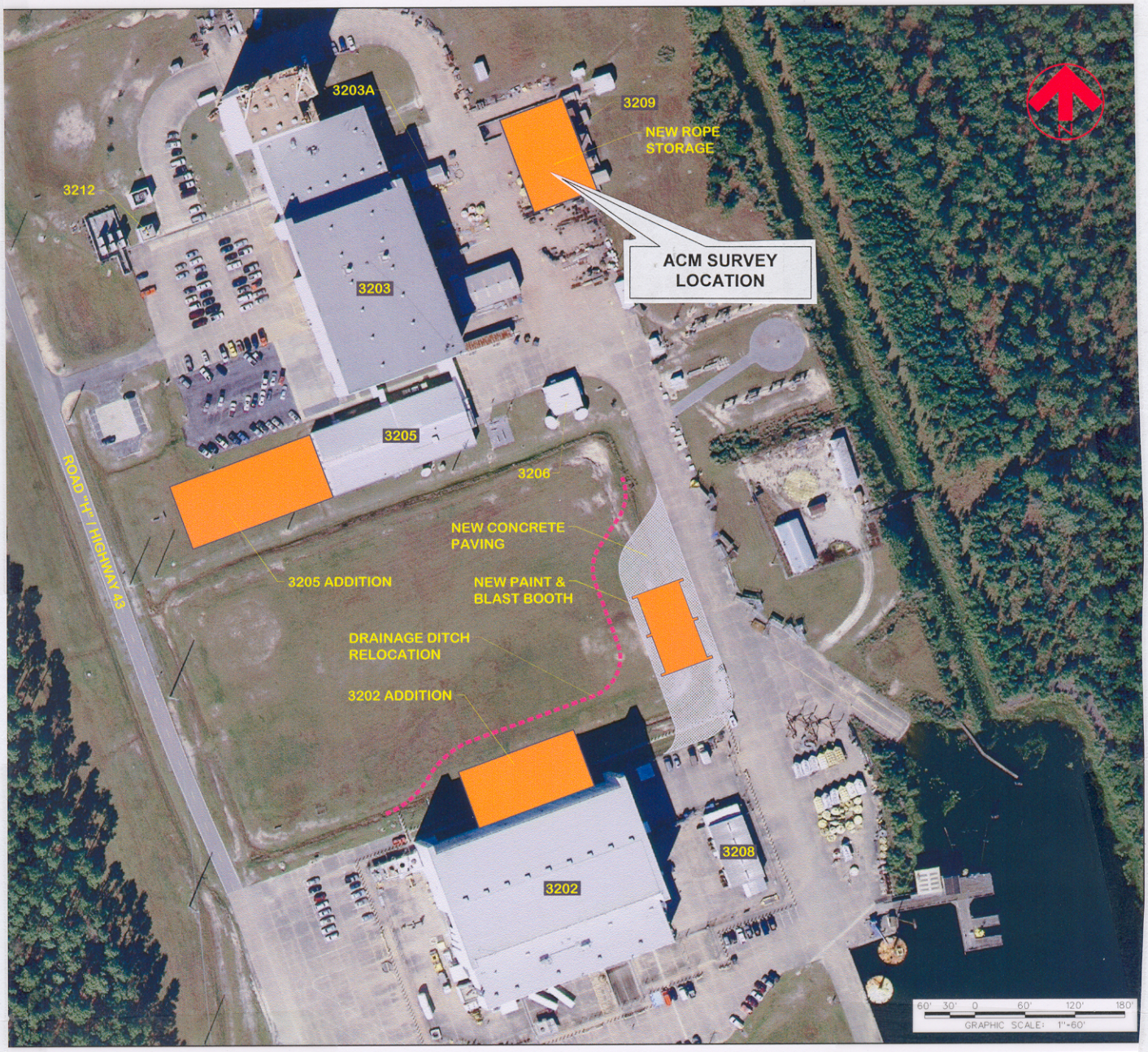
Appendix A Personnel Accreditation Certificates
Appendix B Laboratory Analysis Reports for ACM Survey Conducted by BAT Associates, Inc. (May 2008)

1.0 INTRODUCTION

BAT Associates, Inc. (BAT) was contracted by Mason and Hanger, Inc. to perform a pre-demolition asbestos-containing material (ACM) survey of Building 3209 and it's associated structures located at the Stennis Space Center in Mississippi. The purpose of this survey was to identify ACM prior to planned demolition activities. All of the structures are scheduled for complete demolition. The structures are identified as Building 3209, Sand Hopper No. 1, Sand Hopper No. 2, Satellite Accumulation Area, Compressor Building, Paint Storage Building, and Ancillary Storage 1.

BAT performed an asbestos inspection of the structures to identify ACM that would require removal prior to demolition. This inspection identified no materials containing asbestos in a concentration greater that one percent in any of the seven structures.

Figure 1 shows the location of the subject structures.



BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
Oak Ridge, Tennessee 37830

DATE 05-27-08
DWN. HG
APPR. CMA
REVIS.
PROJECT NO.
081005.01

ASBESTOS SURVEY - BUILDING 3209
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 1
SITE LAYOUT MAP

2.0 INSPECTION FOR ASBESTOS-CONTAINING MATERIALS

2.1 Purpose

The purpose for this ACM inspection was to identify and quantify materials to be removed prior to scheduled demolition activities. In accordance with National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR 61-Subpart M, paragraph 145, all ACM, including regulated, Category I, and Category II non-friable ACM, must be identified and removed prior to demolition.

2.2 Inspection for Asbestos-Containing Materials

The ACM identification survey was performed on May 5, 2008 by Mr. Craig M. Aurin, an accredited inspector in accordance with the Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA) and the State of Mississippi (Certification No. I-011498). Accreditation certificates for Mr. Aurin are provided in Appendix A.

The ACM survey included a visual inspection of all areas of the structures, including the interior and exterior. Destructive testing was permitted and performed to verify the existence and extent of ACM. The inspection was performed in accordance with AHERA and ASHARA for interior sampling and the National Emission Standard for Hazardous Air Pollutants (NESHAP) for exterior sampling focusing on demolition requirements.

All suspect materials, or homogeneous areas (HAs), were visually identified. Typical HAs identified, sampled, and analyzed included: caulking, thermal system insulation (TSI), and building insulation.

The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining techniques in accordance with EPA Method EPA/600/R-93/116 of July 1993. The samples were received by Analytical Environmental Services, Inc. (AES) on May 9, 2008. AES is accredited by the National Institute of Standards and Technology, and is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP).

In accordance with AHERA protocols, all samples within a HA must have an asbestos content of one percent or less by weight, using PLM analysis, before the material can be categorized as non-asbestos-containing. If one sample is determined as asbestos-containing the entire homogeneous area must be classified asbestos-containing.

2.2.1 Building 3209 Area

Building 3209 is a metal framed spray booth that is surrounded by six other structures. The structures are identified as Sand Hopper No. 1, Sand Hopper No. 2, Satellite Accumulation Area, Compressor Building, Paint Storage Building, and Ancillary Storage 1.

Three HAs were identified (see Table 1) and nine samples were analyzed (Appendix B). Laboratory analysis identified no materials containing asbestos in a concentration greater that one percent in any of the samples analyzed. Sample locations are shown in Figure 2.

TABLE 1. HOMOGENOUS AREA (HA) LIST; BUILDING 3209 AREA			
HA NUMBER	**HA DESCRIPTION**	**LOCATION**	**RESULT**
3209-01	Black foam TSI and mastic	Compressor Building, Sand Hopper No. 1 and Building 3209	NAD
3209-02	Interior wall/ceiling insulation	Interior – Paint Storage Building	NAD
3209-03	Caulking	Exterior – Compressor Building	NAD

1. No suspect materials were observed in the ancillary storage, satellite accumulation area, or sand hopper No. 1.
2. NAD = No Asbestos Detected

BAT
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ENVIRONMENTAL, HEALTH, SAFETY SERVICES
181 Lafayette Drive
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ASBESTOS SURVEY - BUILDING 3209
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

FIGURE 2
SAMPLE LOCATIONS

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Asbestos-Containing Materials

Based on the analytical results, no asbestos-containing materials in a concentration greater than one percent are present in any of the seven structures of the Building 3209 area. Therefore, no material will require removal prior to demolition activities in regards to asbestos.

APPENDIX A

PERSONNEL ACCREDITATION CERTIFICATES

M·E·T·A

Mayhew Environmental Training Associates

INCORPORATED

Certificate # 7ME11020702AIR0033

This is to certify that

Craig Aurin

has on 11/02/2007, in Nashville, TN
completed the requirements for asbestos accreditation under Section 206 of TSCA Title II, 15 U.S.C. 2646

AHERA Asbestos Building Inspector Refresher Course

as approved by the U.S.E.P.A. under 40 C.F.R. 763 (AHERA)
on 11/02/2007 - 11/02/2007 and passed the associated examination on 11/02/2007
with a score of 70% or better
CM = 0.50 Pts.

KANSAS MAYHEW INC. 1987 EST. 1985 ENVIRONMENTAL TRAINING ASSOCIATES SAFETY IN GOD ALONE

Instructor
Ronald Francis

Accreditation Expires: 11/2/08

President
Thomas Bradford Mayhew

M E T A - P.O. Box 786 - Lawrence KS 66044 - 800-444-6382

The State of Mississippi

Department of Environmental Quality

Certificate

In accordance with the Asbestos Abatement Accreditation and Certification Act, enacted as 1989 Mississippi Law, Ch. 505,

Be it known that

Craig M Aurin

having submitted acceptable evidence of qualifications and training and other appropriate information, is hereby granted

Inspector

certification.

Certificate No. **I-011498**

Expires **November 02, 2008**

Training Expires on November 02, 2008

Jimmie S. Ashwill

CHIEF, CERTIFICATION BRANCH

APPENDIX B

LABORATORY ANALYSIS REPORTS FOR ACM SURVEY CONDUCTED BY BAT ASSOCIATES, INC. (MAY 2008)

0805616

BAT ASSOCIATES, INC.
Chain-of-Custody

№ 383

Project #	Project Name/Location
081005-01	STENNIS SPACE CTR - BLDG 3209

Samplers: (signature)

Station #	Date	Time	Comp	Grab	Station Location	No. of Containers	Parameters: PLM						REMARKS
	5/5/08			X	3209-01-01	1	X						BLACK FOAM/MASTIC TSI
					3209-01-02								"
					3209-01-03								"
					3209-02-01								WALL/CEILING INSULATION
					3209-02-02								"
					3209-02-03								"
					3209-03-01								ROOF CAULKING
					3209-03-02								"
					3209-03-03								"

Relinquished by: (signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
	5/7/08	12:20	Paula Tr 5/9/08 9:25				
Relinquished by: (signature)	Date	Time	Received by: (Signature) FEDEX	Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (signature)	Date	Time	Received for laboratory by: (Signature)	Date	Time	Remarks:	

Distribution: Original Accompanies Shipment. Copy returned with Report.

Form #93-09

JULY 1993

Analytical Environmental Services, Inc. **Date:** *16-May-08*

CLIENT: BAT Associates, Inc.
Project: STENNIS SPACE CTR-BLDG 3209
Lab Order: 0805616

CASE NARRATIVE

SAMPLES ARE LABELED ACCORDING TO COC INFORMATION.

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

Bulk Sample Summary Report

Client Name: **BAT Associates, Inc.**
Project Name: **STENNIS SPACE CTR-BLDG 3209**
Project Number: **081005-01**

NVLAP Lab ID# 102082-0
AES Job Number: **0805616**

Client ID	AES ID	Location	Asbestos Mineral Percentage						Comments
			CH	AM	CR	AN	TR	AC	
3209-01-01 Layer: 1	0805616-001A	Black Foam / Mastic TSI	ND	ND	ND	ND	ND	ND	Paint included as binder
3209-01-02 Layer: 1	0805616-002A	Black Foam / Mastic TSI	ND	ND	ND	ND	ND	ND	
3209-01-03 Layer: 1	0805616-003A	Black Foam / Mastic TSI	ND	ND	ND	ND	ND	ND	
3209-02-01 Layer: 1	0805616-004A	Wall / Ceiling Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3209-02-02 Layer: 1	0805616-005A	Wall / Ceiling Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3209-02-03 Layer: 1	0805616-006A	Wall / Ceiling Insulation	ND	ND	ND	ND	ND	ND	Paint included as binder
3209-03-01 Layer: 1	0805616-007A	Roof Caulking	ND	ND	ND	ND	ND	ND	
3209-03-02 Layer: 1	0805616-008A	Roof Caulking	ND	ND	ND	ND	ND	ND	
3209-03-03 Layer: 1	0805616-009A	Roof Caulking	ND	ND	ND	ND	ND	ND	

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophylite
For comments on the samples, see the individual analysis sheets.
ND = None Detected
PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to determine the conclusive asbestos content.

It is certified by the signatures below that the laboratory identified is accredited by the National Institute of Standards and Technology for Polarized Light Microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Quality Assurance Program, Laboratory ID 102082-0. All percentages given are by visually estimated volume. All analyses are performed in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials, EPA/600/R-93/116, July 1993." This report must not be reproduced except in full without the approval of Analytical Environmental Service, Inc. These test results apply only to the samples actually tested.

Microanalyst: Arkadiy Gendlin

QC Analyst: Yelena Khanina

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 3

Lead Containing Components Inspection

Building 3202, 3205, 3209 Area

TCLP Lead Testing

LEAD-BASED PAINT AND LEAD CONTAINING COMPONENTS INSPECTION

for

Buildings 3202, 3205, 3209 and Adjacent Ancillary Structures
NASA Stennis Space Center, Mississippi

Prepared for:
The Mason & Hanger Group, Inc.
300 W. Vine Street, Suite 1300
Lexington, KY 40507-1814

Prepared by:
BAT Associates, Inc.
5151 Brook Hollow Parkway
Suite 250
Norcross, GA 30071

June 5, 2008

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2.0 GENERAL INFORMATION.....2

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4.0 INSPECTION TESTING RESULTS.....3

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FIGURE 1 LBP INSPECTION AREAS - BUILDING 3205

TABLE 1 ABBREVIATED XRF GENERATED TESTING DATA

TABLE 2 DETAILED XRF TESTING DATA

APPENDIX A BUILDING LAYOUT IDENTIFYING LBP LOCATIONS

APPENDIX B CREDENTIALS AND LICENSES

APPENDIX C SUPPLEMENTAL DOCUMENTS

Niton XRF Performance Characteristics Sheets

1.0 ROJECT SUMMARY

This report documents a Lead-Based Paint (LBP) and Lead-Containing Components (LCCs) Inspection conducted at Buildings 3202, 3205 and 3209, NASA Stennis Space Center, Mississippi. The report contains technical data generated by a portable XRF lead paint analyzer and a visual inspection of the property. The LBP and LCC Inspection was conducted on May 5 and 6, 2008 by Scott Drinko, an Environmental Protection Agency (EPA) Certified LBP Inspector with BAT Associates, Inc. (BAT). Mr. Drinko's pertinent training certificates are included in Appendix B. The LBP Inspection was conducted in accordance with all applicable Housing and Urban Development (HUD), Environmental Protection Agency (EPA), Occupational Health and Safety Administration (OSHA), and State regulations.

Building 3202 is a metal hanger type building. The exterior walls and roof are metal, supported by a steel infrastructure. The floor is concrete. BAT inspected only Side B of Building 3202. Building 3205 is a single story pre-engineered metal office building. The exterior walls and roof are metal, supported by a steel infrastructure. The floor is concrete and carpet. The interior walls are constructed with drywall mounted on metal studs. The ceiling is a drop ceiling. The windows are made of aluminum. BAT inspected only those areas impacted by proposed renovations and additions (see Figure 1). Building 3209 is single story structure with open aired steel media blast and painting area. Building 3209 has 6 adjacent ancillary structures: Compressor Building (Metal), Hopper 1 (Metal), Hopper 2 (Metal), Paint Storage (Metal), Storage 2 (Metal) and the Accumulation Area (Metal). BAT inspected all areas of every structure associated with Building 3209.

Each side of all buildings was assigned a letter designation, A through D. Side A is the street side of the building, with sides B, C and D following in a clockwise direction. Lead-based paint was identified using a Niton XRF Analyzer at:

- Building 3202
  - Side B, all interior grey metal horizontal and vertical "I" beams and supporting structural metal and hardware. The supporting structural metal and hardware include sill plate, diagonal "X" support beams and nuts/bolts.
  - Side B interior grey/orange metal door frames associated with doors 6 and 7.

- Building 3209, Compressor Building
  - Interior blue structural metal (all).
  - Interior beige compressor unit.
  - Exterior, side D, brown metal door trim.
  - Exterior, side A, warning sign.

- Building 3209, Paint Storage
  - Exterior (white) and interior (grey), side C, metal door and frame.
  - Exterior (white) and interior (grey) metal wall panels. Interior LBP is located under foam wall insulation.

All identified LBP is intact and in good condition. A detailed description of the XRF results and testing locations are included in Tables 1 and 2.

2.0 GENERAL INFORMATION

DATE OF INSPECTION: May 4 and 5, 2008

DATE OF THIS REPORT: June 5, 2008

FACILITY: Buildings 3203, 3205 and 3209

ADDRESS OF PROPERTY: NASA Stennis Space Center, Stennis, Mississippi

DATE OF CONSTRUCTION: Unknown

OWNER ID: NASA

LBP INSPECTOR ID: Scott Drinko
BAT Associates, Inc.
EPA LBP Inspector Course # 1242

SIGNATURE: 

CERTIFIED FIRM: BAT Associates, Inc.
5151 Brook Hollow Parkway, Suite 250
Norcross, GA 30071
EPA LBP Firm Certification # FL-16451-1
Telephone: (770) 242-3908

TESTING METHODOLOGY: Each accessible painted surface with a distinct painting history was tested using a Niton XLp-300 X-Ray Fluorescence (XRF) Spectrum Analyzer, Serial Number 18388. The assay date for the cadmium source is March 01, 2008. All combinations of interior and exterior components and building materials were tested. This resulted in 454 unique testing locations. The paint testing was accomplished in accordance with the parameters listed in the EPA Performance Characteristics Sheet for the Niton XLp 300. Details are documented on forms that are included in Appendix B.

3.0 DWELLING AND OCCUPANT USE PATTERNS

Building 3202 is a metal hanger type building. This building contains a small office area, a storage area and a large open work space. Building 3205 is a single story pre-

engineered metal office building. This building consists of an office area, an equipment storage area and a laboratory area. Building 3209 is an open aired metal media blast structure. This structure has 6 metal supporting adjacent ancillary structures: Compressor Building, Hopper 1, Hopper 2, Paint Storage, Storage 2 and the Accumulation Area. Buildings 3202, 3205 and 3209 are currently occupied and in use.

4.0 INSPECTION TESTING RESULTS

This section contains the results of the areas that tested positive for lead, as shown in the table below. For details of the testing results, see Table 1.

XRF #	LOCATION	+/-	Paint Color
49	Building 3209-Compressor Bldg.-Side A- Exterior sign	POS	White
50	Building 3209-Compressor Bldg.-Side A- Exterior sign	POS	White
51	Building 3209-Compressor Bldg.-Side A- Exterior sign	POS	Red
52	Building 3209-Compressor Bldg.-Side A- Exterior sign	POS	Red
60	Building 3209-Compressor Bldg.-Side D- Exterior door trim	POS	Brown
82	Building 3209-Compressor Bldg.-Side D- Metal Column	POS	Blue
84	Building 3209-Compressor Bldg.-Side B- Metal Column	POS	Blue
88	Building 3209-Compressor Bldg.-Side D- Metal Horizontal Beam	POS	Blue
91	Building 3209-Compressor Bldg.-Side B- Metal Roof Truss	POS	Blue
94	Building 3209-Compressor Bldg.-Side D- Compressor	POS	Beige
95	Building 3209-Compressor Bldg.-Side D- Compressor	POS	Beige
96	Building 3209-Compressor Bldg.-Side D- Compressor	POS	Beige
113	Building 3209-Paint Storage 1-Side B-Exterior Metal Wall	POS	White
115	Building 3209-Paint Storage 1-Side D-Exterior Metal Wall	POS	White
126	Building 3209-Paint Storage 1-Side c-Interior Metal Wall	POS	Grey
128	Building 3209-Paint Storage 1-Side B-Interior Metal Door Frame	POS	Brown
129	Building 3209-Paint Storage 1-Side B-Exterior Metal Door Frame	POS	Brown
179	Building 3202-Side B-Interior Metal Sill Plate	POS	Grey
180	Building 3202-Side B-Interior Metal Sill Plate	POS	Grey
181	Building 3202-Side B-Interior Metal Vertical Beam	POS	Grey
182	Building 3202-Side B-Interior Metal Vertical Beam	POS	Grey
183	Building 3202-Side B-Interior Metal Horizontal Beam	POS	Grey
184	Building 3202-Side B-Interior Metal Horizontal Beam	POS	Grey
185	Building 3202-Side B-Interior Metal ‘X” Support Beam	POS	Grey
186	Building 3202-Side B-Interior Metal ‘X” Support Beam	POS	Grey
188	Building 3202-Side B-Interior Metal Door Frame # 7	POS	Grey
191	Building 3202-Side B-Interior I Beam Bolt	POS	Grey
196	Building 3202-Side B-Interior Upper Metal Horizontal Beam	POS	Grey
197	Building 3202-Side B-Interior Upper Metal Vertical Beam	POS	Grey
198	Building 3202-Side B-Interior Upper Metal Vertical Beam	POS	Grey
201	Building 3202-Side B-Interior Upper Metal Vertical I Beam	POS	Grey
234	Building 3202-Side B-Interior Metal Door Frame # 6	POS	Grey
236	Building 3202-Side B-Interior Metal Door Frame # 6	POS	Grey
237	Building 3202-Side B-Interior Metal Door Frame # 7	POS	Orange

Each line in Table 1 represents a unique test and is identified to a specific location. Any test that identified lead paint with a concentration of 1.0 mg/cm^2 or greater is denoted by bold outline and is coded “Positive” for positive in the result column. (Note: EPA limit for lead

in lead-based paints is 1.0 mg/cm^2.) Some of the descriptive data in the Excel XRF summary may be different from the descriptive data located in the Niton XRF summary. Some changes were made to correct inconsistencies that occurred during XRF data entry during the LBP inspection process.

5.0 DISCLOSURE OBLIGATION

A copy of the summary page from this report must be provided to new tenants and purchasers of the subject property under Federal law (24 CFR Part 35 and 40 CFR Part 745) before they become obligated under a lease or sale contract. After a lease or sale contract has been executed, the complete report must be provided to new purchasers and made available to new tenants.

6.0 DISCLAIMER

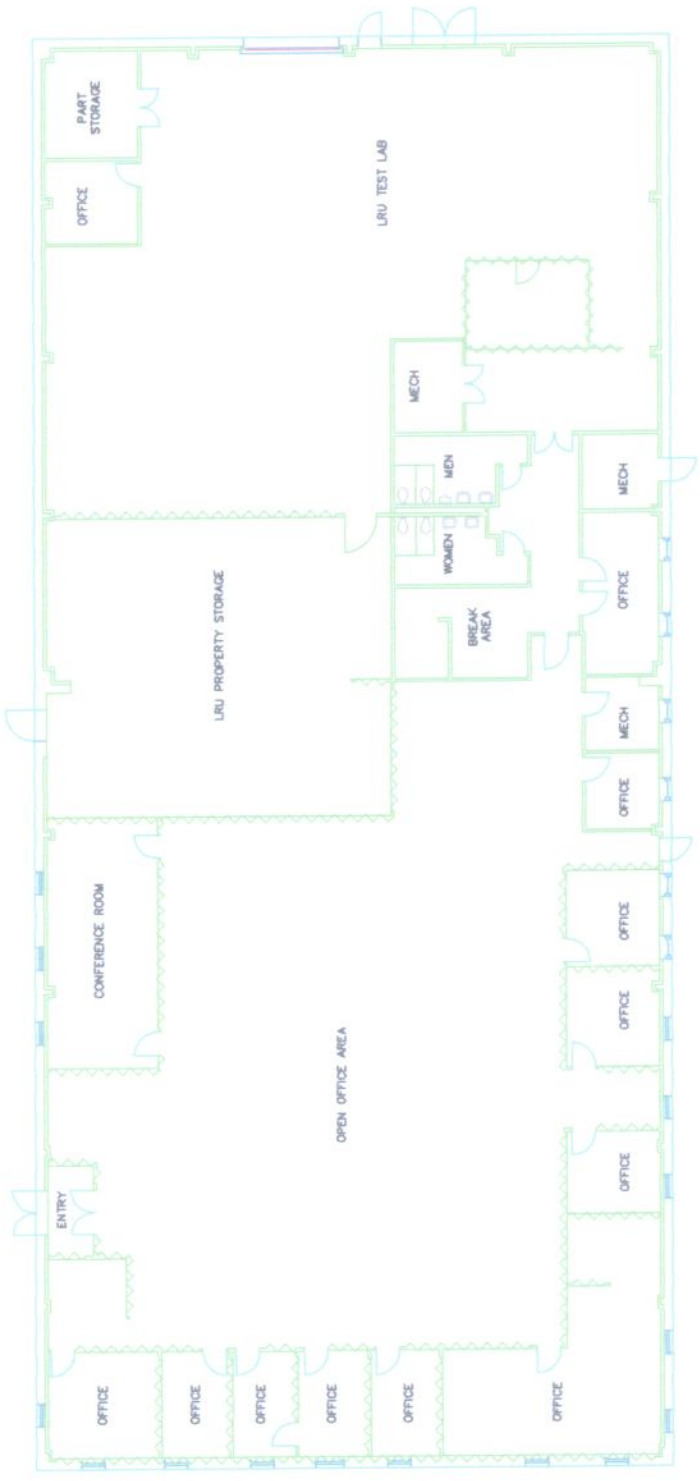
The site that was inspected for this report was Buildings 3202, 3205 and 3209, NASA Stennis Space Center, Mississippi. The type of investigation that was conducted is commonly known as a Lead-Based Paint and Lead Containing Components Inspection.

For the purpose of this report, lead-based paint is defined as containing equal to, or more than, 1.0 milligram of lead per square centimeter. However, there may be surfaces and components on this property that contain less than the threshold amount that could still pose a hazardous risk if disturbed. OSHA, EPA, and the State of Mississippi have regulations that may apply when LBP is disturbed or removed.

The results of this inspection reflect the properties on the days that the inspection was conducted (May 4 and 5, 2008). A reasonable attempt was made to include all painted surfaces. However, if a surface was not accessible, it was not tested and should not be assumed to be free of lead-based paint.

Any activity at the subject property after the date of the inspection visit could alter the results of this investigation. Even without activity, the results of this inspection are considered outdated after one year.

FIGURE 1
LBP INSPECTION AREAS - BUILDING 3205



LEGEND

PLANNED DEMOLITION

NOTE: ALL CEILINGS TO BE REMOVED

NO SCALE

BAT
BAT Associates, Inc.
ENVIRONMENTAL, HEALTH, SAFETY SERVICES
5151 Brook Hollow Parkway, Suite 250
Norcross, Georgia 30071

DATE 00-00-00
DWN. HG
APPR.CMA
REVIS.
PROJECT NO.
081005.02

FIGURE 1
LBP INSPECTION AREAS - BUILDING 3205
NDBC RENOVATION AND EXPANSION
STENNIS SPACE CENTER, MISSISSIPPI

TABLE 1
ABBREVIATED XRF GENERATED TESTING RESULTS

Reading No	Time	Type	Component	Substrate	Side	Color	Floor	Room	Results	Depth Index
28	05/05/2008 10:32	SHUTTER_CAL								
29	05/05/2008 10:38	PAINT			CALIBRATE				**Positive**	1.12
30	05/05/2008 10:38	PAINT			CALIBRATE				Negative	2.26
31	05/05/2008 10:46	PAINT	WALL	METAL	A	BEIGE		3209 media blast	Negative	1
32	05/05/2008 10:47	PAINT	WALL	METAL	B	BEIGE		3209 media blast	Negative	1
33	05/05/2008 10:47	PAINT	WALL	METAL	C	RED		3209 media blast	Negative	1
34	05/05/2008 10:48	PAINT	down spout	METAL	C	TAN		3209 media blast	Negative	1
35	05/05/2008 10:49	PAINT	down spout	METAL	C	TAN		3209 media blast	Negative	3.16
36	05/05/2008 10:49	PAINT	pipe	METAL	C	RED		3209 media blast	Negative	2.8
37	05/05/2008 10:50	PAINT	column	METAL	C	RED		3209 media blast	Negative	1
38	05/05/2008 10:51	PAINT	column	METAL	B	RED		3209 media blast	Negative	1.26
39	05/05/2008 10:51	PAINT	column	METAL	A	RED		3209 media blast	Negative	1
40	05/05/2008 10:51	PAINT	WALL	METAL	A	RED		3209 media blast	Negative	1
41	05/05/2008 10:52	PAINT	WALL	METAL	B	RED		3209 media blast	Negative	1.12
42	05/05/2008 10:52	PAINT	WALL	METAL	C	RED		3209 media blast	Negative	1
43	05/05/2008 10:53	PAINT	pipe	METAL	C	RED		3209 media blast	Negative	3.55
44	05/05/2008 10:54	PAINT	horizontal beam	METAL	C	RED		3209 media blast	Negative	1
45	05/05/2008 10:54	PAINT	horizontal beam	METAL	B	RED		3209 media blast	Negative	1
46	05/05/2008 10:54	PAINT	horizontal beam	METAL	A	RED		3209 media blast	Negative	1.17
47	05/05/2008 10:55	PAINT	fire ext box	METAL	D	RED		3209 media blast	Negative	1
48	05/05/2008 10:56	PAINT	sign	METAL	A	YELLOW		3209 media blast	Negative	1
49	05/05/2008 10:57	PAINT	sign	METAL	A	WHITE		3209 compressor rm	**Positive**	2.5
50	05/05/2008 10:58	PAINT	sign	METAL	A	WHITE		3209 compressor rm	**Positive**	2.2
51	05/05/2008 10:58	PAINT	sign	METAL	A	RED		3209 compressor rm	**Positive**	1.65
52	05/05/2008 10:58	PAINT	sign	METAL	A	RED		3209 compressor rm	**Positive**	2.4
53	05/05/2008 10:59	PAINT	WALL	METAL	A	RED	outside	3209 compressor rm	Negative	1
54	05/05/2008 10:59	PAINT	WALL	METAL	A	BEIGE	outside	3209 compressor rm	Negative	1
55	05/05/2008 11:00	PAINT	WALL	METAL	B	BEIGE	outside	3209 compressor rm	Negative	1
56	05/05/2008 11:00	PAINT	WALL	METAL	C	BEIGE	outside	3209 compressor rm	Negative	1
57	05/05/2008 11:00	PAINT	WALL	METAL	D	BEIGE	outside	3209 compressor rm	Negative	1
58	05/05/2008 11:01	PAINT	DOOR	METAL	D	BLUE	outside	3209 compressor rm	Negative	1
59	05/05/2008 11:02	PAINT	DOOR frame1	METAL	D	BLUE	outside	3209 compressor rm	Negative	1
60	05/05/2008 11:03	PAINT	DOOR trim	METAL	D	BROWN	outside	3209 compressor rm	**Positive**	1
61	05/05/2008 11:03	PAINT	DOOR trim	METAL	A	BROWN	outside	3209 compressor rm	Negative	1
62	05/05/2008 11:04	PAINT	DOOR trim	METAL	D	BROWN	outside	3209 compressor rm	Negative	1
63	05/05/2008 11:04	PAINT	DOOR trim	METAL	D	BROWN	outside	3209 compressor rm	Negative	1
64	05/05/2008 11:05	PAINT	roof trim	METAL	A	BROWN	outside	3209 compressor rm	Negative	1
65	05/05/2008 11:05	PAINT	roof trim	METAL	B	BROWN	outside	3209 compressor rm	Negative	1
66	05/05/2008 11:06	PAINT	roof trim	METAL	C	BROWN	outside	3209 compressor rm	Negative	1
67	05/05/2008 11:06	PAINT	roof trim	METAL	D	BROWN	outside	3209 compressor rm	Negative	1
68	05/05/2008 11:06	PAINT	roof	METAL	D	BEIGE	outside	3209 compressor rm	Negative	2.29
69	05/05/2008 11:07	PAINT	gutter	METAL	C	BEIGE	outside	3209 compressor rm	Negative	1.1
70	05/05/2008 11:07	PAINT	gutter	METAL	D	BEIGE	outside	3209 compressor rm	Negative	1
71	05/05/2008 11:08	PAINT	exhaust hood	METAL	A	BROWN	outside	3209 compressor rm	Negative	1.59
72	05/05/2008 11:10	PAINT	electric box	METAL	D	BEIGE	outside	3209 compressor rm	Negative	1
73	05/05/2008 11:10	PAINT	down spout	METAL	D	WHITE	outside	3209 compressor rm	Negative	1

74	05/05/2008 11:11	PAINT	down spout	METAL	B	WHITE	outside	3209 compressor rm	Negative	1
75	05/05/2008 11:11	PAINT	vent	METAL	C	BROWN	outside	3209 compressor rm	Negative	1.18
76	05/05/2008 11:13	PAINT	WALL	METAL	A	YELLOW	outside	3209 compressor rm	Negative	1
77	05/05/2008 11:14	PAINT	FLOOR	CONCRETE	D	YELLOW	outside	3209 compressor rm	Negative	1
78	05/05/2008 11:15	PAINT	WALL	METAL	A	BEIGE	inside	3209 compressor rm	Negative	1
79	05/05/2008 11:15	PAINT	WALL	METAL	B	BEIGE	inside	3209 compressor rm	Negative	1
80	05/05/2008 11:16	PAINT	WALL	METAL	C	BEIGE	inside	3209 compressor rm	Negative	1
81	05/05/2008 11:16	PAINT	WALL	METAL	D	BEIGE	inside	3209 compressor rm	Negative	1
82	05/05/2008 11:16	PAINT	column	METAL	D	BLUE	inside	3209 compressor rm	**Positive**	1
83	05/05/2008 11:17	PAINT	column	METAL	A	BLUE	inside	3209 compressor rm	Negative	1
84	05/05/2008 11:17	PAINT	column	METAL	B	BLUE	inside	3209 compressor rm	**Positive**	1
85	05/05/2008 11:18	PAINT	column	METAL	C	BLUE	inside	3209 compressor rm	Negative	1
86	05/05/2008 11:18	PAINT	column vent	METAL	C	BLUE	inside	3209 compressor rm	Negative	1
87	05/05/2008 11:19	PAINT	horiz support	METAL	C	BLUE	inside	3209 compressor rm	Negative	1
88	05/05/2008 11:19	PAINT	horiz support	METAL	D	BLUE	inside	3209 compressor rm	**Positive**	1.38
89	05/05/2008 11:20	PAINT	horiz support	METAL	A	BLUE	inside	3209 compressor rm	Negative	1
90	05/05/2008 11:20	PAINT	horiz support	METAL	B	BLUE	inside	3209 compressor rm	Negative	1
91	05/05/2008 11:21	PAINT	roof truss	METAL	B	BLUE	inside	3209 compressor rm	**Positive**	1
92	05/05/2008 11:22	PAINT	door	METAL	D	BLUE	inside	3209 compressor rm	Negative	1
93	05/05/2008 11:22	PAINT	door frame	METAL	D	BLUE	inside	3209 compressor rm	Negative	1
94	05/05/2008 11:23	PAINT	compressor	METAL	D	BEIGE	inside	3209 compressor rm	**Positive**	1
95	05/05/2008 11:23	PAINT	compressor	METAL	D	BEIGE	inside	3209 compressor rm	**Positive**	1
96	05/05/2008 11:23	PAINT	compressor	METAL	D	BEIGE	inside	3209 compressor rm	**Positive**	1
97	05/05/2008 11:25	PAINT	beam	METAL	A	BEIGE	outside	3209 hopper 2	Negative	5.27
98	05/05/2008 11:25	PAINT	beam	METAL	B	BEIGE	outside	3209 hopper 2	Negative	3.5
99	05/05/2008 11:26	PAINT	beam	METAL	C	BEIGE	outside	3209 hopper 2	Negative	1.99
100	05/05/2008 11:26	PAINT	beam	METAL	D	BEIGE	outside	3209 hopper 2	Negative	10
101	05/05/2008 11:27	PAINT	holding tank	METAL	D	GREEN	outside	3209 hopper 2	Negative	1.85
102	05/05/2008 11:27	PAINT	holding tank	METAL	C	GREEN	outside	3209 hopper 2	Negative	2.15
103	05/05/2008 11:29	PAINT	holding tank	METAL	C	GREEN	outside	3209 hopper 1	Negative	1
104	05/05/2008 11:29	PAINT	holding tank	METAL	D	GREEN	outside	3209 hopper 1	Negative	1
105	05/05/2008 11:30	PAINT	beam	METAL	A	GREEN	outside	3209 hopper 1	Negative	1.91
106	05/05/2008 11:30	PAINT	beam	METAL	B	GREEN	outside	3209 hopper 1	Negative	1
107	05/05/2008 11:30	PAINT	beam	METAL	C	GREEN	outside	3209 hopper 1	Negative	1
108	05/05/2008 11:30	PAINT	beam	METAL	D	GREEN	outside	3209 hopper 1	Negative	1
109	05/05/2008 11:31	PAINT	wheeled cart	METAL	D	GREEN	outside	3209 hopper 1	Negative	1
110	05/05/2008 11:31	PAINT	wheeled cart	METAL	D	GREEN	outside	3209 hopper 1	Negative	1
111	05/05/2008 11:31	PAINT	wheeled cart	METAL	D	GREEN	outside	3209 hopper 1	Negative	1
112	05/05/2008 11:33	PAINT	WALL	METAL	A	WHITE	outside	3209 paint storage 1	Negative	3.89
113	05/05/2008 11:33	PAINT	WALL	METAL	B	WHITE	outside	3209 paint storage 1	**Positive**	4.32
114	05/05/2008 11:33	PAINT	WALL	METAL	C	WHITE	outside	3209 paint storage 1	Negative	1
115	05/05/2008 11:33	PAINT	WALL	METAL	D	WHITE	outside	3209 paint storage 1	**Positive**	2.46
116	05/05/2008 11:34	PAINT	fire box	METAL	B	BEIGE	outside	3209 paint storage 1	Negative	1
117	05/05/2008 11:35	PAINT	elect box	METAL	D	RED	outside	3209 paint storage 1	Negative	1
118	05/05/2008 11:36	PAINT	conduit	METAL	D	BEIGE	outside	3209 paint storage 1	Negative	1
119	05/05/2008 11:42	PAINT	roof	METAL	D	BEIGE	outside	3209 paint storage 1	Negative	2.32
120	05/05/2008 11:43	PAINT	roof trim	METAL	D	WHITE	outside	3209 paint storage 1	Negative	2.02

121	05/05/2008 11:43	PAINT	roof trim	METAL	C	WHITE	outside	3209 paint storage 1	Negative	1.45
122	05/05/2008 11:45	PAINT	shelf	METAL	C	grey	outside	3209 paint storage 1	Negative	1
123	05/05/2008 11:45	PAINT	shelf	METAL	D	grey	outside	3209 paint storage 1	Negative	1
124	05/05/2008 11:46	PAINT	WALL	foam	A	grey	outside	3209 paint storage 1	Negative	4.5
125	05/05/2008 11:46	PAINT	WALL	foam	B	grey	outside	3209 paint storage 1	Negative	1.47
126	05/05/2008 11:47	PAINT	WALL	foam	C	grey	outside	3209 paint storage 1	**Positive**	7.65
127	05/05/2008 11:47	PAINT	WALL	foam	D	grey	outside	3209 paint storage 1	Negative	1.75
128	05/05/2008 11:49	PAINT	DOOR frame	METAL	C	grey	outside	3209 paint storage 1	**Positive**	3.26
129	05/05/2008 11:49	PAINT	DOOR frame	METAL	C	grey	outside	3209 paint storage 1	**Positive**	6.7
130	05/05/2008 11:50	PAINT	DOOR frame	METAL	C	RED	outside	3209 storage 2	Negative	1
131	05/05/2008 11:50	PAINT	DOOR frame	METAL	A	RED	outside	3209 storage 2	Negative	1
132	05/05/2008 11:51	PAINT	DOOR frame	WOOD	A	BEIGE	outside	3209 storage 2	Negative	1
133	05/05/2008 11:51	PAINT	DOOR trim	WOOD	A	BEIGE	outside	3209 storage 2	Negative	1
134	05/05/2008 11:51	PAINT	DOOR	WOOD	A	BEIGE	outside	3209 storage 2	Negative	1
135	05/05/2008 11:52	PAINT	DOOR	plastic	A	WHITE	outside	3209 storage 2	Negative	1
136	05/05/2008 11:53	PAINT	DOOR trim	METAL	A	BROWN	outside	3209 storage 2	Negative	1
137	05/05/2008 11:53	PAINT	WALL	METAL	A	WHITE	outside	3209 storage 2	Negative	1
138	05/05/2008 11:53	PAINT	WALL	METAL	B	WHITE	outside	3209 storage 2	Negative	1
139	05/05/2008 11:54	PAINT	WALL	METAL	C	WHITE	outside	3209 storage 2	Negative	1
140	05/05/2008 11:54	PAINT	WALL	METAL	D	WHITE	outside	3209 storage 2	Negative	1
141	05/05/2008 11:54	PAINT	WALL trim	METAL	D	BROWN	outside	3209 storage 2	Negative	1
142	05/05/2008 11:55	PAINT	WALL trim	METAL	A	BROWN	outside	3209 storage 2	Negative	1
143	05/05/2008 11:55	PAINT	WALL trim	METAL	B	BROWN	outside	3209 storage 2	Negative	1
144	05/05/2008 11:55	PAINT	WALL trim	METAL	C	BROWN	outside	3209 storage 2	Negative	1
145	05/05/2008 11:55	PAINT	elect box	METAL	D	BEIGE	outside	3209 storage 2	Negative	1
146	05/05/2008 11:56	PAINT	roof	METAL	D	WHITE	outside	3209 storage 2	Negative	1
147	05/05/2008 11:57	PAINT	roof	METAL	D	WHITE		3209 storage 2	Negative	1
148	05/05/2008 11:57	PAINT	DOOR	METAL	A	WHITE		3209 storage 2	Negative	1
149	05/05/2008 11:58	PAINT	WALL	METAL	A	WHITE		3209 storage 2	Negative	1
150	05/05/2008 11:58	PAINT	WALL	METAL	B	WHITE		3209 storage 2	Negative	1
151	05/05/2008 11:58	PAINT	WALL	METAL	C	WHITE		3209 storage 2	Negative	1
152	05/05/2008 11:58	PAINT	WALL	METAL	D	WHITE		3209 storage 2	Negative	1
153	05/05/2008 11:59	PAINT	DOOR	WOOD	A	WHITE		3209 storage 2	Negative	1
154	05/05/2008 11:59	PAINT	beam	WOOD	C	BROWN		3209 storage 2	Negative	1
155	05/05/2008 12:00	PAINT	beam	WOOD	A	BROWN		3209 storage 2	Negative	1
156	05/05/2008 12:01	PAINT	walk	CONCRETE	A	YELLOW		3209 storage 2	Negative	2.33
157	05/05/2008 12:02	PAINT	WALL	CONCRETE	A	BLUE	outside	3209 saccumulation area	Negative	1
158	05/05/2008 12:02	PAINT	WALL	CONCRETE	B	BLUE	outside	3209 saccumulation area	Negative	1
159	05/05/2008 12:03	PAINT	WALL	CONCRETE	C	BLUE	outside	3209 saccumulation area	Negative	1
160	05/05/2008 12:03	PAINT	WALL	CONCRETE	D	BLUE	outside	3209 saccumulation area	Negative	1
161	05/05/2008 12:03	PAINT	WALL cover	METAL	C	BROWN	outside	3209 saccumulation area	Negative	1
162	05/05/2008 12:04	PAINT	WALL cover	METAL	C	BROWN	outside	3209 saccumulation area	Negative	1
163	05/05/2008 12:05	PAINT	WALL	METAL	B	BLUE	inside	3209 saccumulation area	Negative	1
164	05/05/2008 12:05	PAINT	WALL	METAL	C	BLUE	inside	3209 saccumulation area	Negative	1
165	05/05/2008 12:05	PAINT	WALL	METAL	D	BLUE	inside	3209 saccumulation area	Negative	1.29
166	05/05/2008 12:06	PAINT	roof support	METAL	A	BLUE	inside	3209 saccumulation area	Negative	1
167	05/05/2008 12:06	PAINT	roof support	METAL	C	BLUE	inside	3209 saccumulation area	Negative	1

168	05/05/2008 12:07	PAINT	bumber	METAL	C	BROWN	inside	3209	saccumulation area	Negative	1
169	05/05/2008 12:08	PAINT	knee wall	CONCRETE	B	BEIGE		3209		Negative	1.88
170	05/05/2008 12:08	PAINT	knee wall	CONCRETE	B	BEIGE		3209		Negative	1
171	05/05/2008 12:08	PAINT	knee wall	CONCRETE	C	BLUE		3209		Negative	1
172	05/05/2008 12:09	PAINT	knee wall	CONCRETE	C	BLUE		3209		Negative	1
173	05/05/2008 12:10	PAINT	knee wall	CONCRETE	C	black		3209		Negative	3.4
174	05/05/2008 12:11	PAINT	accum. sign	METAL	C	black		3209		Negative	1
175	05/05/2008 12:11	PAINT	accum. sign	METAL	C	RED		3209		Negative	1.74
176	05/05/2008 12:48	PAINT	WALL	METAL	B	grey	inside	3202		Negative	2.23
177	05/05/2008 12:48	PAINT	WALL	METAL	B	grey	inside	3202		Negative	1
178	05/05/2008 12:48	PAINT	WALL	METAL	B	grey	inside	3202		Negative	1.3
179	05/05/2008 12:48	PAINT	sill plate	METAL	B	grey	inside	3202		**Positive**	2.26
180	05/05/2008 12:49	PAINT	sill plate	METAL	B	grey	inside	3202		**Positive**	3.12
181	05/05/2008 12:50	PAINT	vert beam	METAL	B	grey	inside	3202		**Positive**	2.35
182	05/05/2008 12:50	PAINT	vert beam	METAL	B	grey	inside	3202		**Positive**	1.9
183	05/05/2008 12:51	PAINT	horiz beam	METAL	B	grey	inside	3202		**Positive**	2.12
184	05/05/2008 12:51	PAINT	horiz beam	METAL	B	grey	inside	3202		**Positive**	2
185	05/05/2008 12:52	PAINT	x support	METAL	B	grey	inside	3202		**Positive**	2.34
186	05/05/2008 12:52	PAINT	x support	METAL	B	grey	inside	3202		**Positive**	1.76
187	05/05/2008 12:53	PAINT	DOOR	METAL	B	grey	inside	3202		Negative	1.19
188	05/05/2008 12:53	PAINT	DOOR frame	METAL	B	grey	inside	3202		Positive	2.95
189	05/05/2008 12:54	PAINT	conduit	METAL	B	grey	inside	3202		Negative	1
190	05/05/2008 12:54	PAINT	conduit	METAL	B	grey	inside	3202		Negative	2.58
191	05/05/2008 12:55	PAINT	i beam bolt	METAL	B	grey	inside	3202		**Positive**	1.98
192	05/05/2008 12:56	PAINT	valve	METAL	B	grey	inside	3202		Negative	1
193	05/05/2008 12:59	PAINT	hvac duct	METAL	B	grey	inside	3202		Null	1
194	05/05/2008 12:59	PAINT	hvac duct	METAL	B	grey	inside	3202		Negative	1
195	05/05/2008 13:00	PAINT	hvac duct	METAL	B	grey	inside	3202		Negative	1
196	05/05/2008 13:01	PAINT	upper horiz beam	METAL	B	grey	inside	3202		**Positive**	1.91
197	05/05/2008 13:01	PAINT	upper vert beam	METAL	B	grey	inside	3202		**Positive**	1.82
198	05/05/2008 13:01	PAINT	upper vert beam	METAL	B	grey	inside	3202		**Positive**	2.13
199	05/05/2008 13:02	PAINT	upper wall	METAL	B	grey	inside	3202		Negative	3.04
200	05/05/2008 13:02	PAINT	upper wall	METAL	B	grey	inside	3202		Negative	2.22
201	05/05/2008 13:03	PAINT	upper i beam	METAL	B	grey	inside	3202		**Positive**	1.68
202	05/05/2008 13:04	PAINT	upper conduit	METAL	B	grey	inside	3202		Negative	1.23
203	05/05/2008 13:06	PAINT	elect box	METAL	B	grey	inside	3202		Negative	1
204	05/05/2008 13:07	PAINT	valve	METAL	B	grey	inside	3202		Negative	1.4
205	05/05/2008 13:07	PAINT	FLOOR	CONCRETE	B	YELLOW	inside	3202		Negative	1
206	05/05/2008 13:08	PAINT	FLOOR	CONCRETE	B	YELLOW	inside	3202		Negative	1
207	05/05/2008 13:11	PAINT	DOOR	METAL	B	grey	inside	3202	bath	Negative	1
208	05/05/2008 13:11	PAINT	DOOR frame	METAL	B	grey	inside	3202	bath	Negative	1.44
209	05/05/2008 13:12	PAINT	WALL	CONCRETE	B	grey	inside	3202	bath	Negative	3.94
210	05/05/2008 13:12	PAINT	WALL	CONCRETE	B	grey	inside	3202	bath	Negative	1
211	05/05/2008 13:12	PAINT	WALL	CONCRETE	B	grey	inside	3202	bath	Negative	1.36
212	05/05/2008 13:13	PAINT	CEILING trim	WOOD	B	grey	inside	3202	bath	Negative	1
213	05/05/2008 13:13	PAINT	WALL	WOOD	B	BLUE	inside	3202	bath	Negative	1
214	05/05/2008 13:13	PAINT	WALL	WOOD	B	BLUE	inside	3202	bath	Negative	1

215	05/05/2008 13:13	PAINT	WALL	WOOD	B	BLUE	inside	3202 bath		Negative	2.58
216	05/05/2008 13:14	PAINT	WALL	WOOD	B	BLUE	inside	3202 bath		Negative	1
217	05/05/2008 13:14	PAINT	DOOR	METAL	B	BLUE	inside	3202 bath		Negative	1
218	05/05/2008 13:14	PAINT	DOOR	METAL	B	BLUE	inside	3202 bath		Negative	5.12
219	05/05/2008 13:14	PAINT	FLOOR	tile	B	BEIGE	inside	3202 bath		Negative	2.18
220	05/05/2008 13:15	PAINT	FLOOR	tile	B	BEIGE	inside	3202 bath		Negative	1.54
221	05/05/2008 13:15	PAINT	DOOR	METAL	B	BLUE	inside	3202 bath		Negative	1
222	05/05/2008 13:15	PAINT	DOOR	METAL	B	BLUE	inside	3202 bath		Negative	1
223	05/05/2008 13:16	PAINT	toilet	porc.	B	WHITE	inside	3202 bath		Negative	1
224	05/05/2008 13:16	PAINT	toilet	porc.	B	WHITE	inside	3202 bath		Negative	3.43
225	05/05/2008 13:16	PAINT	sink	porc.	B	WHITE	inside	3202 bath		Negative	1
226	05/05/2008 13:17	PAINT	cabinet	WOOD	B	BROWN	inside	3202 bath		Negative	1
227	05/05/2008 13:17	PAINT	WALL	CONCRETE	B	BROWN	inside	3202 bath		Negative	1
228	05/05/2008 13:17	PAINT	WALL	CONCRETE	B	BROWN	inside	3202 bath		Negative	1
229	05/05/2008 13:17	PAINT	WALL	CONCRETE	B	BROWN	inside	3202 bath		Negative	1
230	05/05/2008 13:17	PAINT	WALL	CONCRETE	B	BROWN	inside	3202 bath		Negative	1
231	05/05/2008 13:18	PAINT	sink	porc.	B	BROWN	inside	3202 bath		Negative	1
232	05/05/2008 13:18	PAINT	toilet	porc.	B	BROWN	inside	3202 bath		Negative	1.72
233	05/05/2008 13:20	PAINT	door 7	METAL	B	grey	inside		3202	Negative	1.06
234	05/05/2008 13:21	PAINT	DOOR frame	METAL	B	grey	inside	3202		**Positive**	2.18
235	05/05/2008 13:22	PAINT	DOOR 6	METAL	B	grey	inside	3202		Negative	1.01
236	05/05/2008 13:22	PAINT	DOOR frame	METAL	B	grey	inside	3202		**Positive**	2.62
237	05/05/2008 13:23	PAINT	DOOR frame	METAL	B	orange	inside	3202		**Positive**	1.54
238	05/05/2008 13:25	PAINT	WALL	METAL	B	WHITE	outside	3202		Negative	1.27
239	05/05/2008 13:25	PAINT	WALL	METAL	B	WHITE	outside	3202		Negative	1.37
240	05/05/2008 13:25	PAINT	down spout	METAL	B	WHITE	outside	3202		Negative	1
241	05/05/2008 13:26	PAINT	down spout	METAL	B	WHITE	outside	3202		Negative	1
242	05/05/2008 13:26	PAINT	down spout grate	METAL	B	WHITE	outside	3202		Negative	1
243	05/05/2008 13:26	PAINT	down spout grate	METAL	B	WHITE	outside	3202		Negative	3.16
244	05/05/2008 13:27	PAINT	DOOR 6	METAL	B	WHITE	outside	3202		Negative	4.1
245	05/05/2008 13:27	PAINT	DOOR 6 frame	METAL	B	WHITE	outside	3202		Negative	3.27
246	05/05/2008 13:28	PAINT	DOOR 7 frame	METAL	B	WHITE	outside	3202		Negative	6.79
247	05/05/2008 13:28	PAINT	DOOR 7	METAL	B	WHITE	outside	3202		Negative	5.59
248	05/05/2008 13:29	PAINT	DOOR 7 trim	METAL	B	WHITE	outside	3202		Negative	4.02
249	05/05/2008 13:29	PAINT	DOOR 6 trim	METAL	B	WHITE	outside	3202		Negative	4.32
250	05/05/2008 13:30	PAINT	DOOR 6 sill	CONCRETE	B	WHITE	outside	3202		Negative	3.48
251	05/05/2008 13:30	PAINT	COLUMN	CONCRETE	B	BEIGE	outside	3202		Negative	1
252	05/05/2008 13:31	PAINT	COLUMN	CONCRETE	B	BEIGE	outside	3202		Negative	1
253	05/05/2008 13:31	PAINT	foundation	CONCRETE	B	WHITE	outside	3202		Negative	1.67
254	05/05/2008 13:33	PAINT	COLUMN	METAL	B	BEIGE	outside	3202		Negative	1
255	05/05/2008 13:33	PAINT	COLUMN	METAL	B	BEIGE	outside	3202		Negative	1
256	05/05/2008 13:36	PAINT			CALIBRATE					**Positive**	1.14
257	05/05/2008 13:37	PAINT			CALIBRATE					Null	2.66
258	05/05/2008 13:37	PAINT			CALIBRATE					Null	2.61
259	05/06/2008 8:08	SHUTTER_CAL									
260	05/06/2008 8:10	PAINT			CALIBRATE					Negative	1.06
261	05/06/2008 8:10	PAINT			CALIBRATE					**Positive**	2.51

262	05/06/2008	8:12	PAINT	WALL	METAL	CALIBRATE	WHITE	outside	3205	Negative	1
263	05/06/2008	8:13	PAINT	WALL	METAL	CALIBRATE	BLUE	outside	3205	Negative	1
264	05/06/2008	8:13	PAINT	WALL	METAL	A	BLUE	outside	3205	Negative	1
265	05/06/2008	8:13	PAINT	WALL	METAL	A	WHITE	outside	3205	Negative	1
266	05/06/2008	8:13	PAINT	WALL	METAL	B	WHITE	outside	3205	Negative	1
267	05/06/2008	8:14	PAINT	WALL	METAL	B	BLUE	outside	3205	Negative	1
268	05/06/2008	8:14	PAINT	down spout	METAL	B	WHITE	outside	3205	Negative	1
269	05/06/2008	8:15	PAINT	down spout	METAL	C	WHITE	outside	3205	Negative	1
270	05/06/2008	8:15	PAINT	down spout	METAL	D	WHITE	outside	3205	Negative	1
271	05/06/2008	8:15	PAINT	down spout	METAL	D	BLUE	outside	3205	Negative	1
272	05/06/2008	8:16	PAINT	WALL	METAL	D	BLUE	outside	3205	Negative	1
273	05/06/2008	8:16	PAINT	WALL	METAL	D	WHITE	outside	3205	Negative	1
274	05/06/2008	8:16	PAINT	WINDOW	METAL	D	BROWN	outside	3205	Negative	1
275	05/06/2008	8:17	PAINT	WINDOW trim	METAL	D	BROWN	outside	3205	Negative	1
276	05/06/2008	8:17	PAINT	WINDOW trim	METAL	A	BROWN	outside	3205	Negative	1
277	05/06/2008	8:17	PAINT	WINDOW	METAL	A	BROWN	outside	3205	Negative	1
278	05/06/2008	8:18	PAINT	WINDOW	METAL	B	BROWN	outside	3205	Negative	1
279	05/06/2008	8:18	PAINT	WINDOW trim	METAL	B	BROWN	outside	3205	Negative	1.49
280	05/06/2008	8:19	PAINT	DOOR	METAL	B	BLUE	outside	3205	Negative	1
281	05/06/2008	8:19	PAINT	DOOR trim	METAL	B	BLUE	outside	3205	Negative	1
282	05/06/2008	8:22	PAINT	DOOR trim	METAL	B	BLUE	inside	3205	Negative	1
283	05/06/2008	8:22	PAINT	DOOR	METAL	B	BLUE	inside	3205	Negative	1
284	05/06/2008	8:22	PAINT	WALL	DRYWALL	B	WHITE	inside	3205	Negative	1
285	05/06/2008	8:23	PAINT	WALL	DRYWALL	C	WHITE	inside	3205	Negative	1
286	05/06/2008	8:23	PAINT	WALL	DRYWALL	D	WHITE	inside	3205	Negative	1
287	05/06/2008	8:23	PAINT	WALL	DRYWALL	A	WHITE	inside	3205	Negative	1
288	05/06/2008	8:23	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
289	05/06/2008	8:24	PAINT	DOOR frame	METAL	D	WHITE	inside	3205	Negative	5.47
290	05/06/2008	8:25	PAINT	WALL	DRYWALL	A	WHITE	inside	3205	Negative	1
291	05/06/2008	8:25	PAINT	WALL	DRYWALL	B	WHITE	inside	3205	Negative	1
292	05/06/2008	8:26	PAINT	WALL	DRYWALL	C	WHITE	inside	3205	Negative	1
293	05/06/2008	8:26	PAINT	WALL	DRYWALL	A	WHITE	inside	3205	Negative	1
294	05/06/2008	8:26	PAINT	WALL	DRYWALL	B	WHITE	inside	3205	Negative	1
295	05/06/2008	8:27	PAINT	WALL	DRYWALL	C	WHITE	inside	3205	Negative	1
296	05/06/2008	8:27	PAINT	WALL	DRYWALL	D	WHITE	inside	3205	Negative	1
297	05/06/2008	8:30	PAINT	DOOR	METAL	D	BLUE	inside	3205	Negative	1
298	05/06/2008	8:30	PAINT	DOOR frame	METAL	D	BLUE	inside	3205	Negative	1.7
299	05/06/2008	8:31	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
300	05/06/2008	8:32	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1.5
301	05/06/2008	8:32	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
302	05/06/2008	8:33	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
303	05/06/2008	8:33	PAINT	DOOR frame	METAL	D	BROWN	inside	3205	Negative	1.73
304	05/06/2008	8:34	PAINT	DOOR frame	METAL	A	BROWN	inside	3205	Negative	1.85
305	05/06/2008	8:34	PAINT	DOOR	WOOD	A	BROWN	inside	3205	Negative	1
306	05/06/2008	8:35	PAINT	DOOR	WOOD	B	BROWN	inside	3205	Negative	1
307	05/06/2008	8:35	PAINT	DOOR frame	METAL	B	WHITE	inside	3205	Negative	4.36
308	05/06/2008	8:36	PAINT	DOOR frame	METAL	C	BLUE	inside	3205	Negative	1

309	05/06/2008 8:36	PAINT	DOOR	METAL	C	BLUE	inside	3205	Negative	1
310	05/06/2008 8:37	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
311	05/06/2008 8:37	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
312	05/06/2008 8:38	PAINT	elect. panel	METAL	B	grey	inside	3205	Negative	1
313	05/06/2008 8:40	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
314	05/06/2008 8:40	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
315	05/06/2008 8:40	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	2.67
316	05/06/2008 8:40	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
317	05/06/2008 8:41	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
318	05/06/2008 8:41	PAINT	WINDOW sill	WOOD	B	WHITE	inside	3205	Negative	1
319	05/06/2008 8:42	PAINT	chair rail	WOOD	B	BROWN	inside	3205	Negative	1
320	05/06/2008 8:42	PAINT	CABINET	WOOD	B	BROWN	inside	3205	Negative	1
321	05/06/2008 8:44	PAINT	WALL	WOOD	A	BROWN	inside	3205	Negative	1
322	05/06/2008 8:44	PAINT	WALL	WOOD	B	BROWN	inside	3205	Negative	1
323	05/06/2008 8:44	PAINT	WALL	WOOD	C	BROWN	inside	3205	Negative	1
324	05/06/2008 8:44	PAINT	WALL	WOOD	D	BROWN	inside	3205	Negative	1
325	05/06/2008 8:46	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
326	05/06/2008 8:46	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
327	05/06/2008 8:46	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
328	05/06/2008 8:46	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
329	05/06/2008 8:47	PAINT	WINDOW sill	WOOD	A	WHITE	inside	3205	Negative	1
330	05/06/2008 8:48	PAINT	DOOR	WOOD	C	WHITE	inside	3205	Negative	1
331	05/06/2008 8:49	PAINT	DOOR	WOOD	C	WHITE	inside	3205	Negative	1
332	05/06/2008 8:49	PAINT	WINDOW	WOOD	A	WHITE	inside	3205	Negative	1
333	05/06/2008 8:50	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
334	05/06/2008 8:50	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
335	05/06/2008 8:50	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
336	05/06/2008 8:50	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
337	05/06/2008 8:51	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
338	05/06/2008 8:51	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
339	05/06/2008 8:52	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
340	05/06/2008 8:52	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
341	05/06/2008 8:52	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
342	05/06/2008 8:53	PAINT	DOOR frame	METAL	D	WHITE	inside	3205	Negative	1.12
343	05/06/2008 8:53	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
344	05/06/2008 8:54	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
345	05/06/2008 8:54	PAINT	DOOR	WOOD	B	BROWN	inside	3205	Negative	1
346	05/06/2008 8:54	PAINT	DOOR frame	METAL	B	WHITE	inside	3205	Negative	2.73
347	05/06/2008 8:55	PAINT	window sill	WOOD	A	WHITE	inside	3205	Negative	1
348	05/06/2008 8:55	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1.39
349	05/06/2008 8:55	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
350	05/06/2008 8:55	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
351	05/06/2008 8:55	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1.53
352	05/06/2008 8:57	PAINT	WALL	DRYWALL	D	BLUE	inside	3205	Negative	1
353	05/06/2008 8:57	PAINT	WALL	DRYWALL	A	BLUE	inside	3205	Negative	1
354	05/06/2008 8:57	PAINT	WALL	DRYWALL	B	BLUE	inside	3205	Negative	1
355	05/06/2008 8:58	PAINT	WALL	DRYWALL	C	BLUE	inside	3205	Negative	1

356	05/06/2008 8:58	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
357	05/06/2008 8:58	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
358	05/06/2008 8:59	PAINT	WINDOW sill	WOOD	A	WHITE	inside	3205	Negative	1
359	05/06/2008 8:59	PAINT	vent	METAL	UPPER	WHITE	inside	3205	Negative	1
360	05/06/2008 9:00	PAINT	vent	METAL	UPPER	WHITE	inside	3205	Negative	1
361	05/06/2008 9:01	PAINT	WALL	METAL	A	black	inside	3205	Negative	1
362	05/06/2008 9:01	PAINT	WALL	METAL	B	black	inside	3205	Negative	1
363	05/06/2008 9:02	PAINT	WALL	METAL	C	black	inside	3205	Negative	1
364	05/06/2008 9:02	PAINT	WALL	METAL	D	black	inside	3205	Negative	1
365	05/06/2008 9:02	PAINT	DOOR	WOOD	A	black	inside	3205	Negative	1
366	05/06/2008 9:03	PAINT	DOOR trim	WOOD	A	black	inside	3205	Negative	1
367	05/06/2008 9:03	PAINT	DOOR frame	WOOD	A	WHITE	inside	3205	Negative	1
368	05/06/2008 9:04	PAINT	CEILING	METAL	A	black	inside	3205	Negative	1
369	05/06/2008 9:05	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
370	05/06/2008 9:05	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
371	05/06/2008 9:05	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
372	05/06/2008 9:05	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1.34
373	05/06/2008 9:06	PAINT	WINDOW sill	WOOD	D	WHITE	inside	3205	Negative	1
374	05/06/2008 9:06	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
375	05/06/2008 9:07	PAINT	chair rail	WOOD	A	BROWN	inside	3205	Negative	1
376	05/06/2008 9:07	PAINT	chair rail	WOOD	D	BEIGE	inside	3205	Negative	1
377	05/06/2008 9:08	PAINT	WINDOW sill	WOOD	D	BEIGE	inside	3205	Negative	1
378	05/06/2008 9:08	PAINT	DOOR	WOOD	A	BROWN	inside	3205	Negative	1
379	05/06/2008 9:09	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
380	05/06/2008 9:09	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
381	05/06/2008 9:09	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1.5
382	05/06/2008 9:09	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
383	05/06/2008 9:10	PAINT	vent	METAL	UPPER	BEIGE	inside	3205	Negative	1.58
384	05/06/2008 9:11	PAINT	vent	METAL	UPPER	BEIGE	inside	3205	Negative	1
385	05/06/2008 9:11	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
386	05/06/2008 9:11	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
387	05/06/2008 9:11	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
388	05/06/2008 9:12	PAINT	WINDOW sill	WOOD	D	BEIGE	inside	3205	Negative	1
389	05/06/2008 9:12	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1
390	05/06/2008 9:13	PAINT	DOOR frame	METAL	C	BEIGE	inside	3205	Negative	1
391	05/06/2008 9:13	PAINT	DOOR frame	METAL	B	BEIGE	inside	3205	Negative	4.54
392	05/06/2008 9:14	PAINT	DOOR	WOOD	B	BROWN	inside	3205	Negative	1
393	05/06/2008 9:14	PAINT	WINDOW sill	WOOD	D	WHITE	inside	3205	Negative	1
394	05/06/2008 9:15	PAINT	vent	METAL	UPPER	WHITE	inside	3205	Negative	1
395	05/06/2008 9:15	PAINT	WALL	DRYWALL	A	BEIGE	inside	3205	Negative	1
396	05/06/2008 9:15	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
397	05/06/2008 9:15	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
398	05/06/2008 9:16	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
399	05/06/2008 9:17	PAINT	vent	METAL	UPPER	WHITE	inside	3205	Negative	1
400	05/06/2008 9:17	PAINT	cieling rails	METAL	UPPER	WHITE	inside	3205	Negative	1
401	05/06/2008 9:20	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
402	05/06/2008 9:20	PAINT	DOOR frame	METAL	D	BLUE	inside	3205	Negative	1

403	05/06/2008 9:20	PAINT	WALL	DRYWALL	D	BEIGE	inside	3205	Negative	1
404	05/06/2008 9:21	PAINT	WALL	DRYWALL	C	BEIGE	inside	3205	Negative	1
405	05/06/2008 9:21	PAINT	WALL	DRYWALL	B	BEIGE	inside	3205	Negative	1
406	05/06/2008 9:22	PAINT	vent	METAL	B	silver	inside	3205	Negative	1
407	05/06/2008 9:22	PAINT	duct	METAL	B	silver	inside	3205	Negative	1
408	05/06/2008 9:23	PAINT	hvac unit	METAL	B	grey	inside	3205	Negative	1
409	05/06/2008 9:24	PAINT	pipe mount	METAL	B	WHITE	inside	3205	Negative	4.05
410	05/06/2008 9:24	PAINT	WALL	DRYWALL	A	WHITE	inside	3205	Negative	3.98
411	05/06/2008 9:24	PAINT	WALL	DRYWALL	B	WHITE	inside	3205	Negative	1
412	05/06/2008 9:25	PAINT	WALL	DRYWALL	C	WHITE	inside	3205	Negative	1
413	05/06/2008 9:25	PAINT	WALL	DRYWALL	D	WHITE	inside	3205	Negative	1
414	05/06/2008 9:25	PAINT	FLOOR	CONCRETE	D	RED	inside	3205	Negative	1
415	05/06/2008 9:25	PAINT	DOOR	WOOD	D	BROWN	inside	3205	Negative	1
416	05/06/2008 9:26	PAINT	elect. pnl	METAL	A	grey	inside	3205	Negative	1
417	05/06/2008 9:28	PAINT	FLOOR	CONCRETE	A	RED	inside	3205	Negative	1.78
418	05/06/2008 9:30	PAINT	WINDOW	DRYWALL	A	BEIGE	inside	3205	Negative	1
419	05/06/2008 9:30	PAINT	DOOR	WOOD	A	BROWN	inside	3205	Negative	4.15
420	05/06/2008 9:31	PAINT	DOOR frame	METAL	A	BLUE	inside	3205	Negative	1
421	05/06/2008 9:31	PAINT	DOOR frame	METAL	C	BLUE	inside	3205	Negative	1
422	05/06/2008 9:32	PAINT	DOOR	WOOD	C	BLUE	inside	3205	Negative	1
423	05/06/2008 9:32	PAINT	DOOR	METAL	B	BLUE	inside	3205	Negative	1
424	05/06/2008 9:33	PAINT	DOOR frame	METAL	B	BLUE	inside	3205	Negative	1
425	05/06/2008 9:34	PAINT	DOOR frame	METAL	B	BLUE	outside	3205	Negative	1
426	05/06/2008 9:34	PAINT	DOOR	METAL	B	BLUE	outside	3205	Negative	1
427	05/06/2008 9:35	PAINT	WALL	DRYWALL	A	WHITE	inside	3205	Negative	1
428	05/06/2008 9:35	PAINT	WALL	DRYWALL	B	WHITE	inside	3205	Negative	1
429	05/06/2008 9:35	PAINT	WALL	DRYWALL	C	WHITE	inside	3205	Negative	4.93
430	05/06/2008 9:35	PAINT	WALL	DRYWALL	D	WHITE	inside	3205	Negative	1
431	05/06/2008 9:36	PAINT	elect. panel	METAL	D	grey	inside	3205	Negative	1
432	05/06/2008 9:37	PAINT	cieling rail	METAL	D	WHITE	inside	3205	Negative	1
433	05/06/2008 9:37	PAINT	vent	METAL	D	silver	inside	3205	Negative	1
434	05/06/2008 9:38	PAINT	vent	METAL	UPPER	silver	inside	3205	Negative	1
435	05/06/2008 9:41	PAINT	wall	plastic	B	BEIGE	inside	3205	Negative	1
436	05/06/2008 9:43	PAINT	wall	plastic	B	BEIGE	inside	3205	Negative	1
437	05/06/2008 9:44	PAINT	wall	DRYWALL	B	BEIGE	inside	3205	Negative	1
438	05/06/2008 9:44	PAINT	wall	DRYWALL	C	BEIGE	inside	3205	Negative	1
439	05/06/2008 9:44	PAINT	wall	DRYWALL	D	BEIGE	inside	3205	Negative	1
440	05/06/2008 9:44	PAINT	wall	DRYWALL	A	BEIGE	inside	3205	Negative	1
441	05/06/2008 9:45	PAINT	DOOR	WOOD	C	BROWN	inside	3205	Negative	1.29
442	05/06/2008 9:45	PAINT	DOOR frame	METAL	C	BLUE	inside	3205	Negative	1
443	05/06/2008 9:56	PAINT	gutter	METAL	B	WHITE	outside	3205	Negative	1
444	05/06/2008 9:56	PAINT	gutter	METAL	D	WHITE	outside	3205	Negative	1
445	05/06/2008 9:57	PAINT	roof trim	METAL	A	BEIGE	outside	3205	Negative	1
446	05/06/2008 10:02	PAINT	roof trim	METAL	A	BEIGE	outside	3205	Negative	1
447	05/06/2008 10:03	PAINT	roof	METAL	A	silver	outside	3205	Negative	1
448	05/06/2008 10:03	PAINT	roof peak	METAL	A	silver	outside	3205	Negative	1
449	05/06/2008 10:29	PAINT	WINDOW	METAL	A	BROWN	inside	3205	Negative	1

450	05/06/2008 10:30	PAINT	WINDOW	METAL	A	BROWN	inside	3205		Negative	2.12
451	05/06/2008 10:31	PAINT	WINDOW	METAL	A	BROWN	inside	3205		Negative	1
452	05/06/2008 10:31	PAINT	WINDOW	METAL	A	BROWN	inside	3205		Negative	1.46
453	05/06/2008 10:32	PAINT	WINDOW	METAL	A	BROWN	inside	3205		Negative	2.02
454	05/06/2008 10:32	PAINT	WINDOW	METAL	D	BROWN	inside	3205		Negative	1
455	05/06/2008 10:39	PAINT	door vent	METAL	A	BROWN	inside	3205		Negative	1
456	05/06/2008 10:40	PAINT	DOOR	WOOD	C	BROWN	inside	3205		Negative	1
457	05/06/2008 10:40	PAINT	WALL	WOOD	A	BROWN	inside	3205		Negative	1
458	05/06/2008 10:40	PAINT	WALL	WOOD	B	BROWN	inside	3205		Negative	1
459	05/06/2008 10:40	PAINT	WALL	WOOD	C	BROWN	inside	3205		Negative	4.15
460	05/06/2008 10:40	PAINT	WALL	WOOD	D	BROWN	inside	3205		Negative	1
461	05/06/2008 10:41	PAINT	WINDOW	METAL	A	BROWN	inside	3205		Negative	1
462	05/06/2008 10:41	PAINT	WINDOW	METAL	B	BROWN	inside	3205		Negative	5.89
463	05/06/2008 10:42	PAINT	WINDOW sill	WOOD	B	BROWN	inside	3205		Negative	1
464	05/06/2008 10:42	PAINT	WINDOW sill	WOOD	A	BROWN	inside	3205		Negative	1
465	05/06/2008 10:43	PAINT	vent	METAL	UPPER	WHITE	inside	3205		Negative	1
466	05/06/2008 10:45	PAINT			CALIBRATE			3205		**Positive**	1.08
467	05/06/2008 10:46	PAINT			CALIBRATE			3205		**Positive**	2.47

TABLE 2
DETAILED XRF TESTING DATA

Thermo
ELECTRON CORPORATION

NITON Corporation
900 Middlesex Turnpike
Billerica, MA 01821

Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
28	28	2008-05-05 10:32	SHUTTER_CAL	37.90	cps	Final		
29	**29**	**2008-05-05 10:38**	**PAINT**	**20.00**	**mg / cm ^2**	**Final**		
30	30	2008-05-05 10:38	PAINT	3.93	mg / cm ^2	Final		
31	31	2008-05-05 10:46	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
32	32	2008-05-05 10:47	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
33	33	2008-05-05 10:47	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
34	34	2008-05-05 10:48	PAINT	1.13	mg / cm ^2	Final	down spout	METAL
35	35	2008-05-05 10:49	PAINT	1.13	mg / cm ^2	Final	down spout	METAL
36	36	2008-05-05 10:49	PAINT	1.16	mg / cm ^2	Final	pipe	METAL
37	37	2008-05-05 10:50	PAINT	1.13	mg / cm ^2	Final	column	METAL
38	38	2008-05-05 10:51	PAINT	1.13	mg / cm ^2	Final	column	METAL
39	39	2008-05-05 10:51	PAINT	1.12	mg / cm ^2	Final	column	METAL
40	40	2008-05-05 10:51	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
41	41	2008-05-05 10:52	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
42	42	2008-05-05 10:52	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
43	43	2008-05-05 10:53	PAINT	1.13	mg / cm ^2	Final	pipe	METAL
44	44	2008-05-05 10:54	PAINT	1.12	mg / cm ^2	Final	horizontal beam	METAL
45	45	2008-05-05 10:54	PAINT	1.11	mg / cm ^2	Final	horizontal beam	METAL
46	46	2008-05-05 10:54	PAINT	5.03	mg / cm ^2	Final	horizontal beam	METAL
47	47	2008-05-05 10:55	PAINT	2.26	mg / cm ^2	Final	fire ext box	METAL
48	48	2008-05-05 10:56	PAINT	3.35	mg / cm ^2	Final	sign	METAL
49	**49**	**2008-05-05 10:57**	**PAINT**	**1.12**	**mg / cm ^2**	**Final**	**sign**	**METAL**
50	**50**	**2008-05-05 10:58**	**PAINT**	**3.38**	**mg / cm ^2**	**Final**	**sign**	**METAL**
51	**51**	**2008-05-05 10:58**	**PAINT**	**1.12**	**mg / cm ^2**	**Final**	**sign**	**METAL**
52	**52**	**2008-05-05 10:58**	**PAINT**	**3.39**	**mg / cm ^2**	**Final**	**sign**	**METAL**
53	53	2008-05-05 10:59	PAINT	1.15	mg / cm ^2	Final	WALL	METAL
54	54	2008-05-05 10:59	PAINT	1.11	mg / cm ^2	Final	WALL	METAL

NITON Corporation
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Side	Condition	Color	Site	Inspector	Floor	Room
CALIBRATE			**nasa stennis mississippi**	**scott drinko**		
CALIBRATE			nasa stennis mississippi	scott drinko		
A	CRACKED	BEIGE	nasa stennis mississippi	scott drinko		3209 media blast
B	CRACKED	BEIGE	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	TAN	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	TAN	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
B	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
A	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
A	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
B	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
B	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
A	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
D	INTACT	RED	nasa stennis mississippi	scott drinko		3209 media blast
A	INTACT	YELLOW	nasa stennis mississippi	scott drinko		3209 media blast
A	**INTACT**	**WHITE**	**nasa stennis mississippi**	**scott drinko**		**3209 compressor rm**
A	**INTACT**	**WHITE**	**nasa stennis mississippi**	**scott drinko**		**3209 compressor rm**
A	**INTACT**	**RED**	**nasa stennis mississippi**	**scott drinko**		**3209 compressor rm**
A	**INTACT**	**RED**	**nasa stennis mississippi**	**scott drinko**		**3209 compressor rm**
A	INTACT	RED	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm

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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
		432.69	4.30	2.43				1.45 ± 0.00
					Positive	**1.12**	**1.00**	**1.00 ± 0.10**
					Negative	2.26	1.00	0.80 ± 0.20
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.08
					Negative	3.16	1.00	< LOD : 0.52
					Negative	2.80	1.00	< LOD : 0.86
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.26	1.00	< LOD : 0.17
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.12	1.00	< LOD : 0.09
					Negative	1.00	1.00	< LOD : 0.03
					Negative	3.55	1.00	< LOD : 0.71
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.17	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Positive	**2.50**	**1.00**	**< LOD : 1.35**
					Positive	**2.20**	**1.00**	**1.10 ± 0.30**
					Positive	**1.65**	**1.00**	**1.20 ± 0.70**
					Positive	**2.40**	**1.00**	**1.20 ± 0.40**
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.04

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PbC	PbK
11.27 ± 0.00	0.05 ± 0.00
1.00 ± 0.10	**0.50 ± 0.30**
0.80 ± 0.20	< LOD : 1.05
< LOD : 0.04	< LOD : 2.83
< LOD : 0.03	< LOD : 4.20
< LOD : 0.03	< LOD : 3.59
< LOD : 0.08	< LOD : 2.49
< LOD : 0.52	< LOD : 1.89
< LOD : 0.86	< LOD : 4.05
< LOD : 0.03	< LOD : 4.23
< LOD : 0.17	< LOD : 4.13
< LOD : 0.03	< LOD : 4.45
< LOD : 0.03	< LOD : 3.00
< LOD : 0.09	< LOD : 3.50
< LOD : 0.03	< LOD : 4.01
< LOD : 0.71	< LOD : 4.17
< LOD : 0.03	< LOD : 3.95
< LOD : 0.05	< LOD : 3.83
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.52
< LOD : 0.03	< LOD : 1.08
< LOD : 4.35	**< LOD : 4.35**
2.20 ± 0.80	**2.20 ± 0.80**
< LOD : 4.50	**< LOD : 4.50**
2.10 ± 0.80	**2.10 ± 0.80**
< LOD : 0.04	< LOD : 2.83
< LOD : 0.04	< LOD : 3.00

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
55	55	2008-05-05 11:00	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
56	56	2008-05-05 11:00	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
57	57	2008-05-05 11:00	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
58	58	2008-05-05 11:01	PAINT	1.11	mg / cm ^2	Final	DOOR	METAL
59	59	2008-05-05 11:02	PAINT	2.28	mg / cm ^2	Final	DOOR frame1	METAL
60	**60**	**2008-05-05 11:03**	**PAINT**	**3.39**	**mg / cm ^2**	**Final**	**DOOR trim**	**METAL**
61	61	2008-05-05 11:03	PAINT	1.13	mg / cm ^2	Final	DOOR trim	METAL
62	62	2008-05-05 11:04	PAINT	1.14	mg / cm ^2	Final	DOOR trim	METAL
63	63	2008-05-05 11:04	PAINT	1.14	mg / cm ^2	Final	DOOR trim	METAL
64	64	2008-05-05 11:05	PAINT	1.13	mg / cm ^2	Final	roof trim	METAL
65	65	2008-05-05 11:05	PAINT	1.13	mg / cm ^2	Final	roof trim	METAL
66	66	2008-05-05 11:06	PAINT	1.12	mg / cm ^2	Final	roof trim	METAL
67	67	2008-05-05 11:06	PAINT	1.13	mg / cm ^2	Final	roof trim	METAL
68	68	2008-05-05 11:06	PAINT	1.12	mg / cm ^2	Final	roof	METAL
69	69	2008-05-05 11:07	PAINT	2.23	mg / cm ^2	Final	gutter	METAL
70	70	2008-05-05 11:07	PAINT	1.14	mg / cm ^2	Final	gutter	METAL
71	71	2008-05-05 11:08	PAINT	2.26	mg / cm ^2	Final	exhaust hood	METAL
72	72	2008-05-05 11:10	PAINT	1.12	mg / cm ^2	Final	electric box	METAL
73	73	2008-05-05 11:10	PAINT	1.13	mg / cm ^2	Final	down spout	METAL
74	74	2008-05-05 11:11	PAINT	1.14	mg / cm ^2	Final	down spout	METAL
75	75	2008-05-05 11:11	PAINT	1.12	mg / cm ^2	Final	vent	METAL
76	76	2008-05-05 11:13	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
77	77	2008-05-05 11:14	PAINT	3.38	mg / cm ^2	Final	FLOOR	CONCRETE
78	78	2008-05-05 11:15	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
79	79	2008-05-05 11:15	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
80	80	2008-05-05 11:16	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
81	81	2008-05-05 11:16	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
82	**82**	**2008-05-05 11:16**	**PAINT**	**2.82**	**mg / cm ^2**	**Final**	**column**	**METAL**
83	83	2008-05-05 11:17	PAINT	1.12	mg / cm ^2	Final	column	METAL
84	**84**	**2008-05-05 11:17**	**PAINT**	**1.11**	**mg / cm ^2**	**Final**	**column**	**METAL**
85	85	2008-05-05 11:18	PAINT	1.12	mg / cm ^2	Final	column	METAL
86	86	2008-05-05 11:18	PAINT	1.12	mg / cm ^2	Final	column vent	METAL
87	87	2008-05-05 11:19	PAINT	1.12	mg / cm ^2	Final	horiz support	METAL
88	**88**	**2008-05-05 11:19**	**PAINT**	**1.67**	**mg / cm ^2**	**Final**	**horiz support**	**METAL**
89	89	2008-05-05 11:20	PAINT	1.15	mg / cm ^2	Final	horiz support	METAL
90	90	2008-05-05 11:20	PAINT	1.13	mg / cm ^2	Final	horiz support	METAL
91	**91**	**2008-05-05 11:21**	**PAINT**	**3.38**	**mg / cm ^2**	**Final**	**roof truss**	**METAL**
92	92	2008-05-05 11:22	PAINT	1.15	mg / cm ^2	Final	door	METAL
93	93	2008-05-05 11:22	PAINT	1.13	mg / cm ^2	Final	door frame	METAL
94	**94**	**2008-05-05 11:23**	**PAINT**	**2.25**	**mg / cm ^2**	**Final**	**compressor**	**METAL**
95	**95**	**2008-05-05 11:23**	**PAINT**	**2.81**	**mg / cm ^2**	**Final**	**compressor**	**METAL**
96	**96**	**2008-05-05 11:23**	**PAINT**	**1.69**	**mg / cm ^2**	**Final**	**compressor**	**METAL**
97	97	2008-05-05 11:25	PAINT	1.12	mg / cm ^2	Final	beam	METAL
98	98	2008-05-05 11:25	PAINT	1.13	mg / cm ^2	Final	beam	METAL
99	99	2008-05-05 11:26	PAINT	1.12	mg / cm ^2	Final	beam	METAL
100	100	2008-05-05 11:26	PAINT	3.95	mg / cm ^2	Final	beam	METAL
101	101	2008-05-05 11:27	PAINT	1.11	mg / cm ^2	Final	holding tank	METAL
102	102	2008-05-05 11:27	PAINT	1.12	mg / cm ^2	Final	holding tank	METAL
103	103	2008-05-05 11:29	PAINT	1.14	mg / cm ^2	Final	holding tank	METAL
104	104	2008-05-05 11:29	PAINT	1.12	mg / cm ^2	Final	holding tank	METAL
105	105	2008-05-05 11:30	PAINT	1.13	mg / cm ^2	Final	beam	METAL
106	106	2008-05-05 11:30	PAINT	1.13	mg / cm ^2	Final	beam	METAL
107	107	2008-05-05 11:30	PAINT	1.13	mg / cm ^2	Final	beam	METAL
108	108	2008-05-05 11:30	PAINT	1.12	mg / cm ^2	Final	beam	METAL

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Side	Condition	Color	Site	Inspector	Floor	Room
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	**INTACT**	**BROWN**	**nasa stennis mississippi**	**scott drinko**	**outside**	**3209 compressor rm**
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	**INTACT**	**BEIGE**	**nasa stennis mississippi**	**scott drinko**	**outside**	**3209 compressor rm**
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
A	INTACT	YELLOW	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
D	INTACT	YELLOW	nasa stennis mississippi	scott drinko	outside	3209 compressor rm
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
D	**INTACT**	**BLUE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
B	**INTACT**	**BLUE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
D	**INTACT**	**BLUE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
B	**INTACT**	**BLUE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	inside	3209 compressor rm
D	**INTACT**	**BEIGE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
D	**INTACT**	**BEIGE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
D	**INTACT**	**BEIGE**	**nasa stennis mississippi**	**scott drinko**	**inside**	**3209 compressor rm**
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
C	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 2
C	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
A	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
B	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
C	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1

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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.08
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Positive	**1.00**	**1.00**	**< LOD : 0.03**
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.06
					Negative	1.00	1.00	< LOD : 0.07
					Negative	1.00	1.00	< LOD : 0.08
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	2.29	1.00	< LOD : 0.28
					Negative	1.10	1.00	0.30 ± 0.15
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.59	1.00	< LOD : 0.13
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.09
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.18	1.00	< LOD : 0.37
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.08
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Positive	**1.00**	**1.00**	**< LOD : 0.05**
					Negative	1.00	1.00	< LOD : 0.03
					Positive	**1.00**	**1.00**	**< LOD : 0.08**
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.10
					Negative	1.00	1.00	< LOD : 0.10
					Positive	**1.38**	**1.00**	**< LOD : 0.13**
					Negative	1.00	1.00	< LOD : 0.09
					Negative	1.00	1.00	< LOD : 0.10
					Positive	**1.00**	**1.00**	**< LOD : 0.04**
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.08
					Positive	**1.00**	**1.00**	**< LOD : 0.03**
					Positive	**1.00**	**1.00**	**< LOD : 0.03**
					Positive	**1.00**	**1.00**	**< LOD : 0.03**
					Negative	5.27	1.00	< LOD : 0.77
					Negative	3.50	1.00	< LOD : 0.32
					Negative	1.99	1.00	< LOD : 0.20
					Negative	10.00	1.00	< LOD : 0.83
					Negative	1.85	1.00	< LOD : 0.16
					Negative	2.15	1.00	< LOD : 0.21
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.15
					Negative	1.91	1.00	< LOD : 0.36
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03

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PbC	PbK
< LOD : 0.04	< LOD : 3.12
< LOD : 0.08	< LOD : 2.89
< LOD : 0.05	< LOD : 3.17
< LOD : 0.03	< LOD : 3.68
< LOD : 0.03	< LOD : 2.85
2.00 ± 0.80	**2.00 ± 0.80**
< LOD : 0.05	< LOD : 2.57
< LOD : 0.04	< LOD : 3.22
< LOD : 0.06	< LOD : 3.00
< LOD : 0.07	< LOD : 2.36
< LOD : 0.08	< LOD : 2.62
< LOD : 0.03	< LOD : 2.46
< LOD : 0.04	< LOD : 2.44
< LOD : 0.28	< LOD : 2.71
0.30 ± 0.15	< LOD : 1.20
< LOD : 0.03	< LOD : 2.85
< LOD : 0.13	< LOD : 1.66
< LOD : 0.03	< LOD : 3.79
< LOD : 0.09	< LOD : 2.55
< LOD : 0.04	< LOD : 2.53
< LOD : 0.37	< LOD : 4.20
< LOD : 0.03	< LOD : 2.75
< LOD : 0.03	< LOD : 1.39
< LOD : 0.08	< LOD : 2.88
< LOD : 0.03	< LOD : 3.33
< LOD : 0.03	< LOD : 2.73
< LOD : 0.03	< LOD : 2.82
3.00 ± 1.80	**3.00 ± 1.80**
< LOD : 0.03	< LOD : 3.90
< LOD : 4.80	**< LOD : 4.80**
< LOD : 0.05	< LOD : 3.89
< LOD : 0.10	< LOD : 3.90
< LOD : 0.10	< LOD : 3.90
< LOD : 3.45	**< LOD : 3.45**
< LOD : 0.09	< LOD : 3.75
< LOD : 0.10	< LOD : 4.05
2.20 ± 1.00	**2.20 ± 1.00**
< LOD : 0.03	< LOD : 3.25
< LOD : 0.08	< LOD : 4.20
3.40 ± 2.20	**3.40 ± 2.20**
2.90 ± 1.90	**2.90 ± 1.90**
< LOD : 4.05	**< LOD : 4.05**
< LOD : 0.77	< LOD : 4.35
< LOD : 0.32	< LOD : 3.99
< LOD : 0.20	< LOD : 4.07
< LOD : 1.36	< LOD : 1.36
< LOD : 0.16	< LOD : 3.99
< LOD : 0.21	< LOD : 3.91
< LOD : 0.03	< LOD : 3.74
< LOD : 0.15	< LOD : 3.90
< LOD : 0.36	< LOD : 3.81
< LOD : 0.05	< LOD : 3.87
< LOD : 0.03	< LOD : 4.20
< LOD : 0.03	< LOD : 4.27

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
109	109	2008-05-05 11:31	PAINT	1.13	mg / cm ^2	Final	wheeled cart	METAL
110	110	2008-05-05 11:31	PAINT	1.11	mg / cm ^2	Final	wheeled cart	METAL
111	111	2008-05-05 11:31	PAINT	1.14	mg / cm ^2	Final	wheeled cart	METAL
112	112	2008-05-05 11:33	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
113	113	2008-05-05 11:33	PAINT	1.69	mg / cm ^2	Final	WALL	METAL
114	114	2008-05-05 11:33	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
115	115	2008-05-05 11:33	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
116	116	2008-05-05 11:34	PAINT	1.69	mg / cm ^2	Final	fire box	METAL
117	117	2008-05-05 11:35	PAINT	1.13	mg / cm ^2	Final	elect box	METAL
118	118	2008-05-05 11:36	PAINT	1.15	mg / cm ^2	Final	conduit	METAL
119	119	2008-05-05 11:42	PAINT	1.13	mg / cm ^2	Final	roof	METAL
120	120	2008-05-05 11:43	PAINT	1.12	mg / cm ^2	Final	roof trim	METAL
121	121	2008-05-05 11:43	PAINT	1.11	mg / cm ^2	Final	roof trim	METAL
122	122	2008-05-05 11:45	PAINT	1.13	mg / cm ^2	Final	shelf	METAL
123	123	2008-05-05 11:45	PAINT	1.12	mg / cm ^2	Final	shelf	METAL
124	124	2008-05-05 11:46	PAINT	1.68	mg / cm ^2	Final	WALL	foam
125	125	2008-05-05 11:46	PAINT	1.12	mg / cm ^2	Final	WALL	foam
126	126	2008-05-05 11:47	PAINT	1.69	mg / cm ^2	Final	WALL	foam
127	127	2008-05-05 11:47	PAINT	1.12	mg / cm ^2	Final	WALL	foam
128	128	2008-05-05 11:49	PAINT	1.69	mg / cm ^2	Final	DOOR frame	METAL
129	129	2008-05-05 11:49	PAINT	1.69	mg / cm ^2	Final	DOOR frame	METAL
130	130	2008-05-05 11:50	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
131	131	2008-05-05 11:50	PAINT	1.15	mg / cm ^2	Final	DOOR frame	METAL
132	132	2008-05-05 11:51	PAINT	1.12	mg / cm ^2	Final	DOOR frame	WOOD
133	133	2008-05-05 11:51	PAINT	1.12	mg / cm ^2	Final	DOOR trim	WOOD
134	134	2008-05-05 11:51	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
135	135	2008-05-05 11:52	PAINT	1.14	mg / cm ^2	Final	DOOR	plastic
136	136	2008-05-05 11:53	PAINT	1.12	mg / cm ^2	Final	DOOR trim	METAL
137	137	2008-05-05 11:53	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
138	138	2008-05-05 11:53	PAINT	1.15	mg / cm ^2	Final	WALL	METAL
139	139	2008-05-05 11:54	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
140	140	2008-05-05 11:54	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
141	141	2008-05-05 11:54	PAINT	1.13	mg / cm ^2	Final	WALL trim	METAL
142	142	2008-05-05 11:55	PAINT	1.13	mg / cm ^2	Final	WALL trim	METAL
143	143	2008-05-05 11:55	PAINT	1.14	mg / cm ^2	Final	WALL trim	METAL
144	144	2008-05-05 11:55	PAINT	1.12	mg / cm ^2	Final	WALL trim	METAL
145	145	2008-05-05 11:55	PAINT	1.12	mg / cm ^2	Final	elect box	METAL
146	146	2008-05-05 11:56	PAINT	1.15	mg / cm ^2	Final	roof	METAL
147	147	2008-05-05 11:57	PAINT	1.14	mg / cm ^2	Final	roof	METAL
148	148	2008-05-05 11:57	PAINT	1.13	mg / cm ^2	Final	DOOR	METAL
149	149	2008-05-05 11:58	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
150	150	2008-05-05 11:58	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
151	151	2008-05-05 11:58	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
152	152	2008-05-05 11:58	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
153	153	2008-05-05 11:59	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
154	154	2008-05-05 11:59	PAINT	1.12	mg / cm ^2	Final	beam	WOOD
155	155	2008-05-05 12:00	PAINT	1.12	mg / cm ^2	Final	beam	WOOD
156	156	2008-05-05 12:01	PAINT	3.93	mg / cm ^2	Final	walk	CONCRETE
157	157	2008-05-05 12:02	PAINT	2.82	mg / cm ^2	Final	WALL	CONCRETE
158	158	2008-05-05 12:02	PAINT	1.68	mg / cm ^2	Final	WALL	CONCRETE
159	159	2008-05-05 12:03	PAINT	2.81	mg / cm ^2	Final	WALL	CONCRETE
160	160	2008-05-05 12:03	PAINT	3.37	mg / cm ^2	Final	WALL	CONCRETE
161	161	2008-05-05 12:03	PAINT	2.23	mg / cm ^2	Final	WALL cover	METAL
162	162	2008-05-05 12:04	PAINT	1.69	mg / cm ^2	Final	WALL cover	METAL

NITON Corporation
900 Middlesex Turnpike
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Side	Condition	Color	Site	Inspector	Floor	Room
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
D	CRACKED	GREEN	nasa stennis mississippi	scott drinko	outside	3209 hopper 1
A	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
B	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
B	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	RED	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
A	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
B	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
D	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	grey	nasa stennis mississippi	scott drinko	outside	3209 paint storage 1
C	PEELING	RED	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	RED	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	PEELING	BROWN	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 storage 2
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 storage 2
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 storage 2
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 storage 2
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	outside	3209 storage 2
D	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
B	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
C	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
D	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	WHITE	nasa stennis mississippi	scott drinko		3209 storage 2
C	INTACT	BROWN	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	BROWN	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	YELLOW	nasa stennis mississippi	scott drinko		3209 storage 2
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	outside	3209 saccumulation area

NITON Corporation
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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.12
					Negative	3.89	1.00	< LOD : 0.39
					Positive	**4.32**	**1.00**	**2.30 ± 1.10**
					Negative	1.00	1.00	< LOD : 0.05
					Positive	**2.46**	**1.00**	**3.20 ± 1.70**
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.08
					Negative	2.32	1.00	< LOD : 0.19
					Negative	2.02	1.00	< LOD : 0.08
					Negative	1.45	1.00	< LOD : 0.06
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	4.50	1.00	< LOD : 0.26
					Negative	1.47	1.00	< LOD : 0.08
					Positive	**7.65**	**1.00**	**3.00 ± 1.90**
					Negative	1.75	1.00	< LOD : 0.07
					Positive	**3.26**	**1.00**	**2.30 ± 0.90**
					Positive	**6.70**	**1.00**	**3.40 ± 1.90**
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	2.33	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03

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PbC	PbK
< LOD : 0.03	< LOD : 4.15
< LOD : 0.05	< LOD : 4.13
< LOD : 0.12	< LOD : 4.20
< LOD : 0.39	< LOD : 3.75
2.30 ± 1.10	**< LOD : 3.90**
< LOD : 0.05	< LOD : 3.60
3.20 ± 1.70	**< LOD : 5.40**
< LOD : 0.03	< LOD : 1.59
< LOD : 0.03	< LOD : 3.61
< LOD : 0.08	< LOD : 4.19
< LOD : 0.19	< LOD : 3.60
< LOD : 1.68	< LOD : 1.68
< LOD : 0.06	< LOD : 1.72
< LOD : 0.03	< LOD : 3.65
< LOD : 0.03	< LOD : 3.81
< LOD : 1.06	< LOD : 1.06
< LOD : 0.08	< LOD : 1.14
3.00 ± 1.90	**< LOD : 4.20**
< LOD : 0.07	< LOD : 1.40
2.30 ± 0.90	**< LOD : 4.35**
3.40 ± 1.90	**< LOD : 4.20**
< LOD : 0.03	< LOD : 3.68
< LOD : 0.03	< LOD : 3.45
< LOD : 0.03	< LOD : 2.84
< LOD : 0.04	< LOD : 1.95
< LOD : 0.03	< LOD : 2.93
< LOD : 0.03	< LOD : 2.63
< LOD : 0.03	< LOD : 2.40
< LOD : 0.04	< LOD : 2.10
< LOD : 0.03	< LOD : 2.40
< LOD : 0.03	< LOD : 2.54
< LOD : 0.05	< LOD : 2.55
< LOD : 0.05	< LOD : 1.98
< LOD : 0.05	< LOD : 2.56
< LOD : 0.03	< LOD : 2.28
< LOD : 0.03	< LOD : 2.36
< LOD : 0.03	< LOD : 3.69
< LOD : 0.03	< LOD : 1.88
< LOD : 0.03	< LOD : 2.27
< LOD : 0.03	< LOD : 2.43
< LOD : 0.03	< LOD : 2.53
< LOD : 0.04	< LOD : 2.35
< LOD : 0.03	< LOD : 2.49
< LOD : 0.04	< LOD : 2.45
< LOD : 0.03	< LOD : 3.30
< LOD : 0.03	< LOD : 3.94
< LOD : 0.03	< LOD : 3.38
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 2.40
< LOD : 0.03	< LOD : 1.90
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.65
< LOD : 0.03	< LOD : 1.86

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
163	163	2008-05-05 12:05	PAINT	3.35	mg / cm ^2	Final	WALL	METAL
164	164	2008-05-05 12:05	PAINT	2.81	mg / cm ^2	Final	WALL	METAL
165	165	2008-05-05 12:05	PAINT	3.36	mg / cm ^2	Final	WALL	METAL
166	166	2008-05-05 12:06	PAINT	1.13	mg / cm ^2	Final	roof support	METAL
167	167	2008-05-05 12:06	PAINT	1.12	mg / cm ^2	Final	roof support	METAL
168	168	2008-05-05 12:07	PAINT	1.15	mg / cm ^2	Final	bumber	METAL
169	169	2008-05-05 12:08	PAINT	3.93	mg / cm ^2	Final	knee wall	CONCRETE
170	170	2008-05-05 12:08	PAINT	3.36	mg / cm ^2	Final	knee wall	CONCRETE
171	171	2008-05-05 12:08	PAINT	2.80	mg / cm ^2	Final	knee wall	CONCRETE
172	172	2008-05-05 12:09	PAINT	3.38	mg / cm ^2	Final	knee wall	CONCRETE
173	173	2008-05-05 12:10	PAINT	3.36	mg / cm ^2	Final	knee wall	CONCRETE
174	174	2008-05-05 12:11	PAINT	3.93	mg / cm ^2	Final	accum. sign	METAL
175	175	2008-05-05 12:11	PAINT	3.36	mg / cm ^2	Final	accum. sign	METAL
176	176	2008-05-05 12:48	PAINT	1.11	mg / cm ^2	Final	WALL	METAL
177	177	2008-05-05 12:48	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
178	178	2008-05-05 12:48	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
179	179	2008-05-05 12:48	PAINT	0.56	mg / cm ^2	Final	sill plate	METAL
180	180	2008-05-05 12:49	PAINT	0.56	mg / cm ^2	Final	sill plate	METAL
181	181	2008-05-05 12:50	PAINT	1.12	mg / cm ^2	Final	vert beam	METAL
182	182	2008-05-05 12:50	PAINT	0.56	mg / cm ^2	Final	vert beam	METAL
183	183	2008-05-05 12:51	PAINT	0.56	mg / cm ^2	Final	horiz beam	METAL
184	184	2008-05-05 12:51	PAINT	0.56	mg / cm ^2	Final	horiz beam	METAL
185	185	2008-05-05 12:52	PAINT	0.56	mg / cm ^2	Final	x support	METAL
186	186	2008-05-05 12:52	PAINT	0.56	mg / cm ^2	Final	x support	METAL
187	187	2008-05-05 12:53	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
188	188	2008-05-05 12:53	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
189	189	2008-05-05 12:54	PAINT	1.12	mg / cm ^2	Final	conduit	METAL
190	190	2008-05-05 12:54	PAINT	1.13	mg / cm ^2	Final	conduit	METAL
191	191	2008-05-05 12:55	PAINT	0.56	mg / cm ^2	Final	i beam bolt	METAL
192	192	2008-05-05 12:56	PAINT	1.11	mg / cm ^2	Final	valve	METAL
193	193	2008-05-05 12:59	PAINT	0.56	mg / cm ^2	Final	hvac duct	METAL
194	194	2008-05-05 12:59	PAINT	1.14	mg / cm ^2	Final	hvac duct	METAL
195	195	2008-05-05 13:00	PAINT	1.13	mg / cm ^2	Final	hvac duct	METAL
196	196	2008-05-05 13:01	PAINT	0.56	mg / cm ^2	Final	upper horiz beam	METAL
197	197	2008-05-05 13:01	PAINT	0.56	mg / cm ^2	Final	upper vert beam	METAL
198	198	2008-05-05 13:01	PAINT	0.56	mg / cm ^2	Final	upper vert beam	METAL
199	199	2008-05-05 13:02	PAINT	1.13	mg / cm ^2	Final	upper wall	METAL
200	200	2008-05-05 13:02	PAINT	1.12	mg / cm ^2	Final	upper wall	METAL
201	201	2008-05-05 13:03	PAINT	0.56	mg / cm ^2	Final	upper i beam	METAL
202	202	2008-05-05 13:04	PAINT	1.12	mg / cm ^2	Final	upper conduit	METAL
203	203	2008-05-05 13:06	PAINT	1.13	mg / cm ^2	Final	elect box	METAL
204	204	2008-05-05 13:07	PAINT	1.13	mg / cm ^2	Final	valve	METAL
205	205	2008-05-05 13:07	PAINT	2.25	mg / cm ^2	Final	FLOOR	CONCRETE
206	206	2008-05-05 13:08	PAINT	3.93	mg / cm ^2	Final	FLOOR	CONCRETE
207	207	2008-05-05 13:11	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
208	208	2008-05-05 13:11	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
209	209	2008-05-05 13:12	PAINT	3.37	mg / cm ^2	Final	WALL	CONCRETE
210	210	2008-05-05 13:12	PAINT	3.37	mg / cm ^2	Final	WALL	CONCRETE
211	211	2008-05-05 13:12	PAINT	3.37	mg / cm ^2	Final	WALL	CONCRETE
212	212	2008-05-05 13:13	PAINT	1.13	mg / cm ^2	Final	CEILING trim	WOOD
213	213	2008-05-05 13:13	PAINT	1.69	mg / cm ^2	Final	WALL	WOOD
214	214	2008-05-05 13:13	PAINT	2.24	mg / cm ^2	Final	WALL	WOOD
215	215	2008-05-05 13:13	PAINT	2.24	mg / cm ^2	Final	WALL	WOOD
216	216	2008-05-05 13:14	PAINT	3.37	mg / cm ^2	Final	WALL	WOOD

NITON Corporation
900 Middlesex Turnpike
Billerica, MA 01821

Side	Condition	Color	Site	Inspector	Floor	Room
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3209 saccumulation area
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko		3209
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko		3209
C	INTACT	BLUE	nasa stennis mississippi	scott drinko		3209
C	INTACT	BLUE	nasa stennis mississippi	scott drinko		3209
C	INTACT	black	nasa stennis mississippi	scott drinko		3209
C	INTACT	black	nasa stennis mississippi	scott drinko		3209
C	INTACT	RED	nasa stennis mississippi	scott drinko		3209
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	YELLOW	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	YELLOW	nasa stennis mississippi	scott drinko	in	3202
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath

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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.29	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.88	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	3.40	1.00	< LOD : 0.10
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.74	1.00	< LOD : 0.03
					Negative	2.23	1.00	< LOD : 0.23
					Negative	1.00	1.00	< LOD : 0.08
					Negative	1.30	1.00	< LOD : 0.12
					Positive	**2.26**	**1.00**	**< LOD : 10.05**
					Positive	**3.12**	**1.00**	**< LOD : 9.15**
					Positive	**2.35**	**1.00**	**< LOD : 10.35**
					Positive	**1.90**	**1.00**	**< LOD : 9.45**
					Positive	**2.12**	**1.00**	**< LOD : 57.75**
					Positive	**2.00**	**1.00**	**< LOD : 33.45**
					Positive	**2.34**	**1.00**	**< LOD : 77.85**
					Positive	**1.76**	**1.00**	**8.60 ± 5.60**
					Negative	1.19	1.00	< LOD : 0.10
					Positive	**2.95**	**1.00**	**< LOD : 15.30**
					Negative	1.00	1.00	< LOD : 0.14
					Negative	2.58	1.00	< LOD : 0.30
					Positive	**1.98**	**1.00**	**5.40 ± 3.50**
					Negative	1.00	1.00	< LOD : 0.03
					Null	1.00	1.00	< LOD : 0.11
					Negative	1.00	1.00	< LOD : 0.12
					Negative	1.00	1.00	< LOD : 0.10
					Positive	**1.91**	**1.00**	**< LOD : 45.00**
					Positive	**1.82**	**1.00**	**< LOD : 10.65**
					Positive	**2.13**	**1.00**	**< LOD : 46.65**
					Negative	3.04	1.00	< LOD : 0.42
					Negative	2.22	1.00	< LOD : 0.30
					Positive	**1.68**	**1.00**	**8.30 ± 5.30**
					Negative	1.23	1.00	< LOD : 0.19
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.40	1.00	< LOD : 0.34
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.44	1.00	< LOD : 0.06
					Negative	3.94	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.36	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	2.58	1.00	< LOD : 0.07
					Negative	1.00	1.00	< LOD : 0.03

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PbC	PbK
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.95
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 4.09
< LOD : 0.03	< LOD : 4.20
< LOD : 0.04	< LOD : 3.75
< LOD : 0.03	< LOD : 1.05
< LOD : 0.03	< LOD : 1.05
< LOD : 0.03	< LOD : 1.95
< LOD : 0.03	< LOD : 1.20
< LOD : 0.10	< LOD : 1.20
< LOD : 0.03	< LOD : 1.14
< LOD : 0.03	< LOD : 1.20
< LOD : 0.23	< LOD : 3.45
< LOD : 0.08	< LOD : 3.27
< LOD : 0.12	< LOD : 3.10
< LOD : 10.05	**< LOD : 18.00**
< LOD : 9.15	**< LOD : 16.65**
11.00 ± 5.80	**11.00 ± 5.80**
< LOD : 9.45	**< LOD : 17.85**
< LOD : 26.10	**< LOD : 26.10**
< LOD : 30.75	**< LOD : 30.75**
< LOD : 24.45	**< LOD : 24.45**
8.60 ± 5.60	**< LOD : 17.40**
< LOD : 0.10	< LOD : 3.86
13.10 ± 6.10	**13.10 ± 6.10**
< LOD : 0.14	< LOD : 4.20
< LOD : 0.30	< LOD : 3.98
5.40 ± 3.50	**< LOD : 14.55**
< LOD : 0.03	< LOD : 4.06
< LOD : 0.11	< LOD : 6.39
< LOD : 0.12	< LOD : 3.13
< LOD : 0.10	< LOD : 2.80
< LOD : 26.85	**< LOD : 26.85**
< LOD : 10.65	**< LOD : 19.35**
< LOD : 25.95	**< LOD : 25.95**
< LOD : 0.42	< LOD : 2.89
< LOD : 0.30	< LOD : 3.24
8.30 ± 5.30	**< LOD : 17.40**
< LOD : 0.19	< LOD : 3.75
< LOD : 0.03	< LOD : 3.75
< LOD : 0.34	< LOD : 3.75
< LOD : 0.03	< LOD : 2.69
< LOD : 0.03	< LOD : 1.32
< LOD : 0.04	< LOD : 3.10
< LOD : 0.06	< LOD : 3.80
< LOD : 0.05	< LOD : 1.20
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 3.75
< LOD : 0.03	< LOD : 2.55
< LOD : 0.03	< LOD : 2.08
< LOD : 0.07	< LOD : 2.24
< LOD : 0.03	< LOD : 1.11

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
217	217	2008-05-05 13:14	PAINT	1.11	mg / cm ^2	Final	DOOR	METAL
218	218	2008-05-05 13:14	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
219	219	2008-05-05 13:14	PAINT	1.12	mg / cm ^2	Final	FLOOR	tile
220	220	2008-05-05 13:15	PAINT	1.13	mg / cm ^2	Final	FLOOR	tile
221	221	2008-05-05 13:15	PAINT	1.13	mg / cm ^2	Final	DOOR	METAL
222	222	2008-05-05 13:15	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
223	223	2008-05-05 13:16	PAINT	1.12	mg / cm ^2	Final	toilet	porc.
224	224	2008-05-05 13:16	PAINT	2.24	mg / cm ^2	Final	toilet	porc.
225	225	2008-05-05 13:16	PAINT	1.11	mg / cm ^2	Final	sink	porc.
226	226	2008-05-05 13:17	PAINT	1.11	mg / cm ^2	Final	cabinet	WOOD
227	227	2008-05-05 13:17	PAINT	2.80	mg / cm ^2	Final	WALL	CONCRETE
228	228	2008-05-05 13:17	PAINT	1.68	mg / cm ^2	Final	WALL	CONCRETE
229	229	2008-05-05 13:17	PAINT	2.24	mg / cm ^2	Final	WALL	CONCRETE
230	230	2008-05-05 13:17	PAINT	2.81	mg / cm ^2	Final	WALL	CONCRETE
231	231	2008-05-05 13:18	PAINT	1.11	mg / cm ^2	Final	sink	porc.
232	232	2008-05-05 13:18	PAINT	1.13	mg / cm ^2	Final	toilet	porc.
233	233	2008-05-05 13:20	PAINT	1.13	mg / cm ^2	Final	door 7	METAL
234	**234**	**2008-05-05 13:21**	**PAINT**	**0.56**	**mg / cm ^2**	**Final**	**DOOR frame**	**METAL**
235	235	2008-05-05 13:22	PAINT	1.12	mg / cm ^2	Final	DOOR 6	METAL
236	**236**	**2008-05-05 13:22**	**PAINT**	**0.57**	**mg / cm ^2**	**Final**	**DOOR frame**	**METAL**
237	**237**	**2008-05-05 13:23**	**PAINT**	**0.56**	**mg / cm ^2**	**Final**	**DOOR frame**	**METAL**
238	238	2008-05-05 13:25	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
239	239	2008-05-05 13:25	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
240	240	2008-05-05 13:25	PAINT	1.13	mg / cm ^2	Final	down spout	METAL
241	241	2008-05-05 13:26	PAINT	1.12	mg / cm ^2	Final	down spout	METAL
242	242	2008-05-05 13:26	PAINT	1.11	mg / cm ^2	Final	down spout grate	METAL
243	243	2008-05-05 13:26	PAINT	1.11	mg / cm ^2	Final	down spout grate	METAL
244	244	2008-05-05 13:27	PAINT	1.14	mg / cm ^2	Final	DOOR 6	METAL
245	245	2008-05-05 13:27	PAINT	1.11	mg / cm ^2	Final	DOOR 6 frame	METAL
246	246	2008-05-05 13:28	PAINT	1.68	mg / cm ^2	Final	DOOR 7 frame	METAL
247	247	2008-05-05 13:28	PAINT	1.12	mg / cm ^2	Final	DOOR 7	METAL
248	248	2008-05-05 13:29	PAINT	1.12	mg / cm ^2	Final	DOOR 7 trim	METAL
249	249	2008-05-05 13:29	PAINT	1.12	mg / cm ^2	Final	DOOR 6 trim	METAL
250	250	2008-05-05 13:30	PAINT	3.35	mg / cm ^2	Final	DOOR 6 sill	CONCRETE
251	251	2008-05-05 13:30	PAINT	1.11	mg / cm ^2	Final	COLUMN	CONCRETE
252	252	2008-05-05 13:31	PAINT	1.13	mg / cm ^2	Final	COLUMN	CONCRETE
253	253	2008-05-05 13:31	PAINT	3.36	mg / cm ^2	Final	foundation	CONCRETE
254	254	2008-05-05 13:33	PAINT	1.12	mg / cm ^2	Final	COLUMN	METAL
255	255	2008-05-05 13:33	PAINT	1.12	mg / cm ^2	Final	COLUMN	METAL
256	**256**	**2008-05-05 13:36**	**PAINT**	**8.99**	**mg / cm ^2**	**Final**		
257	257	2008-05-05 13:37	PAINT	11.79	mg / cm ^2	Final		
258	258	2008-05-05 13:37	PAINT	20.00	mg / cm ^2	Final		
259	259	2008-05-06 08:08	SHUTTER_CAL	39.83	cps	Final		
260	260	2008-05-06 08:10	PAINT	9.51	mg / cm ^2	Final		
261	**261**	**2008-05-06 08:10**	**PAINT**	**20.00**	**mg / cm ^2**	**Final**		
262	262	2008-05-06 08:12	PAINT	1.14	mg / cm ^2	Final	WALL	METAL
263	263	2008-05-06 08:13	PAINT	1.11	mg / cm ^2	Final	WALL	METAL
264	264	2008-05-06 08:13	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
265	265	2008-05-06 08:13	PAINT	1.15	mg / cm ^2	Final	WALL	METAL
266	266	2008-05-06 08:13	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
267	267	2008-05-06 08:14	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
268	268	2008-05-06 08:14	PAINT	1.13	mg / cm ^2	Final	down spout	METAL
269	269	2008-05-06 08:15	PAINT	1.12	mg / cm ^2	Final	down spout	METAL
270	270	2008-05-06 08:15	PAINT	1.13	mg / cm ^2	Final	down spout	METAL

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Side	Condition	Color	Site	Inspector	Floor	Room
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3202 bath
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	**INTACT**	**grey**	**nasa stennis mississippi**	**scott drinko**	**in**	**3202**
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3202
B	**INTACT**	**grey**	**nasa stennis mississippi**	**scott drinko**	**in**	**3202**
B	**INTACT**	**orange**	**nasa stennis mississippi**	**scott drinko**	**in**	**3202**
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	out	3202
B	POOR	BEIGE	nasa stennis mississippi	scott drinko	out	3202
B	POOR	WHITE	nasa stennis mississippi	scott drinko	out	3202
B	POOR	BEIGE	nasa stennis mississippi	scott drinko	out	3202
B	POOR	BEIGE	nasa stennis mississippi	scott drinko	out	3202
CALIBRATE			**nasa stennis mississippi**	**scott drinko**		
CALIBRATE			nasa stennis mississippi	scott drinko		
CALIBRATE			nasa stennis mississippi	scott drinko		
CALIBRATE			nasa stennis mississippi	scott drinko		
CALIBRATE			**nasa stennis mississippi**	**scott drinko**		
CALIBRATE	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
CALIBRATE	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205

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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
					Negative	1.00	1.00	< LOD : 0.03
					Negative	5.12	1.00	< LOD : 0.23
					Negative	2.18	1.00	< LOD : 0.90
					Negative	1.54	1.00	< LOD : 0.49
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.05
					Negative	3.43	1.00	< LOD : 0.18
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.72	1.00	< LOD : 0.15
					Negative	1.06	1.00	< LOD : 0.07
					Positive	**2.18**	**1.00**	**< LOD : 8.85**
					Negative	1.01	1.00	< LOD : 0.08
					Positive	**2.62**	**1.00**	**< LOD : 12.30**
					Positive	**1.54**	**1.00**	**9.40 ± 6.20**
					Negative	1.27	1.00	< LOD : 0.08
					Negative	1.37	1.00	< LOD : 0.08
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.06
					Negative	1.00	1.00	< LOD : 0.03
					Negative	3.16	1.00	< LOD : 0.22
					Negative	4.10	1.00	< LOD : 0.37
					Negative	3.27	1.00	< LOD : 0.33
					Negative	6.79	1.00	< LOD : 0.54
					Negative	5.59	1.00	< LOD : 0.55
					Negative	4.02	1.00	< LOD : 0.26
					Negative	4.32	1.00	< LOD : 0.22
					Negative	3.48	1.00	< LOD : 0.08
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.06
					Negative	1.67	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Positive	**1.14**	**1.00**	**1.10 ± 0.10**
					Null	2.66	1.00	1.10 ± 0.10
					Null	2.61	1.00	1.00 ± 0.10
		421.59	4.30	2.44				1.65 ± 0.00
					Negative	1.06	1.00	0.90 ± 0.10
					Positive	**2.51**	**1.00**	**1.00 ± 0.10**
					Negative	1.00	1.00	< LOD : 0.06
					Negative	1.00	1.00	< LOD : 0.06
					Negative	1.00	1.00	< LOD : 0.07
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.08

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PbC	PbK
< LOD : 0.03	< LOD : 3.14
< LOD : 0.23	< LOD : 3.15
< LOD : 0.90	< LOD : 5.85
< LOD : 0.49	< LOD : 5.77
< LOD : 0.03	< LOD : 1.66
< LOD : 0.03	< LOD : 3.17
< LOD : 0.05	< LOD : 5.40
< LOD : 0.18	< LOD : 2.70
< LOD : 0.03	< LOD : 3.52
< LOD : 0.04	< LOD : 4.00
< LOD : 0.03	< LOD : 2.00
< LOD : 0.03	< LOD : 2.49
< LOD : 0.03	< LOD : 2.09
< LOD : 0.03	< LOD : 1.97
< LOD : 0.03	< LOD : 3.37
< LOD : 0.15	< LOD : 5.55
< LOD : 0.07	< LOD : 3.77
< LOD : 8.85	**< LOD : 16.50**
< LOD : 0.08	< LOD : 3.70
< LOD : 12.30	**< LOD : 19.05**
< LOD : 20.70	**< LOD : 20.70**
< LOD : 0.08	< LOD : 3.90
< LOD : 0.08	< LOD : 3.50
< LOD : 0.03	< LOD : 3.20
< LOD : 0.06	< LOD : 3.30
< LOD : 0.03	< LOD : 3.59
< LOD : 0.22	< LOD : 3.61
< LOD : 0.37	< LOD : 3.74
< LOD : 0.33	< LOD : 4.65
< LOD : 0.54	< LOD : 3.15
< LOD : 0.55	< LOD : 3.68
< LOD : 0.26	< LOD : 3.67
< LOD : 0.22	< LOD : 3.48
< LOD : 0.08	< LOD : 1.20
< LOD : 0.03	< LOD : 4.35
< LOD : 0.06	< LOD : 4.20
< LOD : 0.04	< LOD : 1.35
< LOD : 0.03	< LOD : 3.93
< LOD : 0.03	< LOD : 3.93
1.10 ± 0.10	**< LOD : 0.60**
1.10 ± 0.10	0.90 ± 0.40
1.00 ± 0.10	0.70 ± 0.30
9.97 ± 0.00	0.00 ± 0.00
0.90 ± 0.10	< LOD : 0.75
1.00 ± 0.10	**0.60 ± 0.30**
< LOD : 0.06	< LOD : 2.94
< LOD : 0.06	< LOD : 3.37
< LOD : 0.07	< LOD : 3.47
< LOD : 0.05	< LOD : 2.88
< LOD : 0.03	< LOD : 3.87
< LOD : 0.03	< LOD : 3.16
< LOD : 0.03	< LOD : 2.55
< LOD : 0.03	< LOD : 2.53
< LOD : 0.08	< LOD : 2.50

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
271	271	2008-05-06 08:15	PAINT	1.12	mg / cm ^2	Final	down spout	METAL
272	272	2008-05-06 08:16	PAINT	1.13	mg / cm ^2	Final	WALL	METAL
273	273	2008-05-06 08:16	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
274	274	2008-05-06 08:16	PAINT	3.36	mg / cm ^2	Final	WINDOW	METAL
275	275	2008-05-06 08:17	PAINT	3.91	mg / cm ^2	Final	WINDOW trim	METAL
276	276	2008-05-06 08:17	PAINT	3.36	mg / cm ^2	Final	WINDOW trim	METAL
277	277	2008-05-06 08:17	PAINT	3.91	mg / cm ^2	Final	WINDOW	METAL
278	278	2008-05-06 08:18	PAINT	3.37	mg / cm ^2	Final	WINDOW	METAL
279	279	2008-05-06 08:18	PAINT	3.37	mg / cm ^2	Final	WINDOW trim	METAL
280	280	2008-05-06 08:19	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
281	281	2008-05-06 08:19	PAINT	1.12	mg / cm ^2	Final	DOOR trim	METAL
282	282	2008-05-06 08:22	PAINT	1.13	mg / cm ^2	Final	DOOR trim	METAL
283	283	2008-05-06 08:22	PAINT	1.12	mg / cm ^2	Final	DOOR	METAL
284	284	2008-05-06 08:22	PAINT	2.79	mg / cm ^2	Final	WALL	DRYWALL
285	285	2008-05-06 08:23	PAINT	1.66	mg / cm ^2	Final	WALL	DRYWALL
286	286	2008-05-06 08:23	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
287	287	2008-05-06 08:23	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
288	288	2008-05-06 08:23	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
289	289	2008-05-06 08:24	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
290	290	2008-05-06 08:25	PAINT	2.25	mg / cm ^2	Final	WALL	DRYWALL
291	291	2008-05-06 08:25	PAINT	1.13	mg / cm ^2	Final	WALL	DRYWALL
292	292	2008-05-06 08:26	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
293	293	2008-05-06 08:26	PAINT	1.66	mg / cm ^2	Final	WALL	DRYWALL
294	294	2008-05-06 08:26	PAINT	1.69	mg / cm ^2	Final	WALL	DRYWALL
295	295	2008-05-06 08:27	PAINT	2.24	mg / cm ^2	Final	WALL	DRYWALL
296	296	2008-05-06 08:27	PAINT	1.13	mg / cm ^2	Final	WALL	DRYWALL
297	297	2008-05-06 08:30	PAINT	1.11	mg / cm ^2	Final	DOOR	METAL
298	298	2008-05-06 08:30	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
299	299	2008-05-06 08:31	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
300	300	2008-05-06 08:32	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
301	301	2008-05-06 08:32	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
302	302	2008-05-06 08:33	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
303	303	2008-05-06 08:33	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
304	304	2008-05-06 08:34	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
305	305	2008-05-06 08:34	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
306	306	2008-05-06 08:35	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
307	307	2008-05-06 08:35	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
308	308	2008-05-06 08:36	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
309	309	2008-05-06 08:36	PAINT	1.13	mg / cm ^2	Final	DOOR	METAL
310	310	2008-05-06 08:37	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
311	311	2008-05-06 08:37	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
312	312	2008-05-06 08:38	PAINT	1.12	mg / cm ^2	Final	elect. panel	METAL
313	313	2008-05-06 08:40	PAINT	2.24	mg / cm ^2	Final	WALL	DRYWALL
314	314	2008-05-06 08:40	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
315	315	2008-05-06 08:40	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
316	316	2008-05-06 08:40	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
317	317	2008-05-06 08:41	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
318	318	2008-05-06 08:41	PAINT	1.12	mg / cm ^2	Final	WINDOW sill	WOOD
319	319	2008-05-06 08:42	PAINT	1.12	mg / cm ^2	Final	chair rail	WOOD
320	320	2008-05-06 08:42	PAINT	1.12	mg / cm ^2	Final	CABINET	WOOD
321	321	2008-05-06 08:44	PAINT	1.69	mg / cm ^2	Final	WALL	WOOD
322	322	2008-05-06 08:44	PAINT	1.13	mg / cm ^2	Final	WALL	WOOD
323	323	2008-05-06 08:44	PAINT	1.67	mg / cm ^2	Final	WALL	WOOD
324	324	2008-05-06 08:44	PAINT	1.68	mg / cm ^2	Final	WALL	WOOD

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Side	Condition	Color	Site	Inspector	Floor	Room
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205

NITON Corporation
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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.49	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	1.00	1.00	< LOD : 0.03
entry					Negative	5.47	1.00	< LOD : 0.57
copier area					Negative	1.00	1.00	< LOD : 0.03
copier area					Negative	1.00	1.00	< LOD : 0.03
copier area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.70	1.00	< LOD : 0.26
cubicle area d side exit hall					Negative	1.00	1.00	< LOD : 0.03
cubicle area d side exit hall					Negative	1.50	1.00	< LOD : 0.04
cubicle area d side exit hall					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.05
cubicle area					Negative	1.73	1.00	< LOD : 0.12
cubicle area					Negative	1.85	1.00	< LOD : 0.15
cubicle area					Negative	1.00	1.00	< LOD : 0.04
cubicle area					Negative	1.00	1.00	< LOD : 0.05
cubicle area					Negative	4.36	1.00	< LOD : 0.34
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
break area					Negative	1.00	1.00	< LOD : 0.03
break area					Negative	1.00	1.00	< LOD : 0.03
break area					Negative	1.00	1.00	< LOD : 0.03
confrence rm					Negative	1.00	1.00	< LOD : 0.03
confrence rm					Negative	1.00	1.00	< LOD : 0.03
confrence rm					Negative	2.67	1.00	< LOD : 0.08
confrence rm					Negative	1.00	1.00	< LOD : 0.03
confrence rm					Negative	1.00	1.00	< LOD : 0.04
confrence rm					Negative	1.00	1.00	< LOD : 0.05
confrence rm					Negative	1.00	1.00	< LOD : 0.06
confrence rm					Negative	1.00	1.00	< LOD : 0.03
100c					Negative	1.00	1.00	< LOD : 0.03
100c					Negative	1.00	1.00	< LOD : 0.03
100c					Negative	1.00	1.00	< LOD : 0.03
100c					Negative	1.00	1.00	< LOD : 0.03

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PbC	PbK
< LOD : 0.03	< LOD : 3.15
< LOD : 0.03	< LOD : 2.95
< LOD : 0.03	< LOD : 2.90
< LOD : 0.03	< LOD : 1.24
< LOD : 0.03	< LOD : 1.17
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 1.17
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 3.50
< LOD : 0.03	< LOD : 3.98
< LOD : 0.03	< LOD : 4.35
< LOD : 0.03	< LOD : 3.41
< LOD : 0.03	< LOD : 1.60
< LOD : 0.03	< LOD : 1.93
< LOD : 0.03	< LOD : 2.18
< LOD : 0.03	< LOD : 2.48
< LOD : 0.03	< LOD : 1.29
< LOD : 0.57	< LOD : 3.90
< LOD : 0.03	< LOD : 1.88
< LOD : 0.03	< LOD : 2.27
< LOD : 0.03	< LOD : 2.29
< LOD : 0.03	< LOD : 2.05
< LOD : 0.03	< LOD : 1.87
< LOD : 0.03	< LOD : 1.65
< LOD : 0.03	< LOD : 2.61
< LOD : 0.03	< LOD : 3.17
< LOD : 0.26	< LOD : 3.65
< LOD : 0.03	< LOD : 1.83
< LOD : 0.04	< LOD : 2.01
< LOD : 0.03	< LOD : 2.19
< LOD : 0.05	< LOD : 2.82
< LOD : 0.12	< LOD : 3.74
< LOD : 0.15	< LOD : 3.60
< LOD : 0.04	< LOD : 2.64
< LOD : 0.05	< LOD : 2.81
< LOD : 0.34	< LOD : 3.62
< LOD : 0.03	< LOD : 3.23
< LOD : 0.03	< LOD : 3.12
< LOD : 0.03	< LOD : 1.82
< LOD : 0.03	< LOD : 1.74
< LOD : 0.03	< LOD : 3.97
< LOD : 0.03	< LOD : 1.65
< LOD : 0.03	< LOD : 1.86
< LOD : 0.08	< LOD : 2.21
< LOD : 0.03	< LOD : 2.15
< LOD : 0.04	< LOD : 3.21
< LOD : 0.05	< LOD : 2.62
< LOD : 0.06	< LOD : 3.33
< LOD : 0.03	< LOD : 1.64
< LOD : 0.03	< LOD : 1.82
< LOD : 0.03	< LOD : 2.22
< LOD : 0.03	< LOD : 1.77
< LOD : 0.03	< LOD : 2.09

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
325	325	2008-05-06 08:46	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
326	326	2008-05-06 08:46	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
327	327	2008-05-06 08:46	PAINT	1.69	mg / cm ^2	Final	WALL	DRYWALL
328	328	2008-05-06 08:46	PAINT	1.69	mg / cm ^2	Final	WALL	DRYWALL
329	329	2008-05-06 08:47	PAINT	1.12	mg / cm ^2	Final	WINDOW sill	WOOD
330	330	2008-05-06 08:48	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
331	331	2008-05-06 08:49	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
332	332	2008-05-06 08:49	PAINT	1.12	mg / cm ^2	Final	WINDOW	WOOD
333	333	2008-05-06 08:50	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
334	334	2008-05-06 08:50	PAINT	1.66	mg / cm ^2	Final	WALL	DRYWALL
335	335	2008-05-06 08:50	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
336	336	2008-05-06 08:50	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
337	337	2008-05-06 08:51	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
338	338	2008-05-06 08:51	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
339	339	2008-05-06 08:52	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
340	340	2008-05-06 08:52	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
341	341	2008-05-06 08:52	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
342	342	2008-05-06 08:53	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
343	343	2008-05-06 08:53	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
344	344	2008-05-06 08:54	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
345	345	2008-05-06 08:54	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
346	346	2008-05-06 08:54	PAINT	1.11	mg / cm ^2	Final	DOOR frame	METAL
347	347	2008-05-06 08:55	PAINT	1.11	mg / cm ^2	Final	window sill	WOOD
348	348	2008-05-06 08:55	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
349	349	2008-05-06 08:55	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
350	350	2008-05-06 08:55	PAINT	1.13	mg / cm ^2	Final	WALL	DRYWALL
351	351	2008-05-06 08:55	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
352	352	2008-05-06 08:57	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
353	353	2008-05-06 08:57	PAINT	1.69	mg / cm ^2	Final	WALL	DRYWALL
354	354	2008-05-06 08:57	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
355	355	2008-05-06 08:58	PAINT	2.24	mg / cm ^2	Final	WALL	DRYWALL
356	356	2008-05-06 08:58	PAINT	1.15	mg / cm ^2	Final	DOOR	WOOD
357	357	2008-05-06 08:58	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
358	358	2008-05-06 08:59	PAINT	1.15	mg / cm ^2	Final	WINDOW sill	WOOD
359	359	2008-05-06 08:59	PAINT	2.79	mg / cm ^2	Final	vent	METAL
360	360	2008-05-06 09:00	PAINT	1.67	mg / cm ^2	Final	vent	METAL
361	361	2008-05-06 09:01	PAINT	1.67	mg / cm ^2	Final	WALL	METAL
362	362	2008-05-06 09:01	PAINT	1.67	mg / cm ^2	Final	WALL	METAL
363	363	2008-05-06 09:02	PAINT	1.68	mg / cm ^2	Final	WALL	METAL
364	364	2008-05-06 09:02	PAINT	1.12	mg / cm ^2	Final	WALL	METAL
365	365	2008-05-06 09:02	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
366	366	2008-05-06 09:03	PAINT	1.13	mg / cm ^2	Final	DOOR trim	WOOD
367	367	2008-05-06 09:03	PAINT	1.11	mg / cm ^2	Final	DOOR frame	WOOD
368	368	2008-05-06 09:04	PAINT	1.13	mg / cm ^2	Final	CEILING	METAL
369	369	2008-05-06 09:05	PAINT	1.69	mg / cm ^2	Final	WALL	DRYWALL
370	370	2008-05-06 09:05	PAINT	1.15	mg / cm ^2	Final	WALL	DRYWALL
371	371	2008-05-06 09:05	PAINT	1.13	mg / cm ^2	Final	WALL	DRYWALL
372	372	2008-05-06 09:05	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
373	373	2008-05-06 09:06	PAINT	1.12	mg / cm ^2	Final	WINDOW sill	WOOD
374	374	2008-05-06 09:06	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
375	375	2008-05-06 09:07	PAINT	1.13	mg / cm ^2	Final	chair rail	WOOD
376	376	2008-05-06 09:07	PAINT	1.12	mg / cm ^2	Final	chair rail	WOOD
377	377	2008-05-06 09:08	PAINT	1.12	mg / cm ^2	Final	WINDOW sill	WOOD
378	378	2008-05-06 09:08	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD

NITON Corporation
900 Middlesex Turnpike
Billerica, MA 01821

Side	Condition	Color	Site	Inspector	Floor	Room
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	black	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205

NITON Corporation
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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
102					Negative	1.00	1.00	< LOD : 0.04
102					Negative	1.00	1.00	< LOD : 0.03
102					Negative	1.00	1.00	< LOD : 0.03
102					Negative	1.00	1.00	< LOD : 0.03
102					Negative	1.00	1.00	< LOD : 0.03
102					Negative	1.00	1.00	< LOD : 0.03
103					Negative	1.00	1.00	< LOD : 0.04
103					Negative	1.00	1.00	< LOD : 0.04
103					Negative	1.00	1.00	< LOD : 0.03
103					Negative	1.00	1.00	< LOD : 0.03
103					Negative	1.00	1.00	< LOD : 0.03
103					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
104					Negative	1.12	1.00	< LOD : 0.07
104					Negative	1.00	1.00	< LOD : 0.04
105					Negative	1.00	1.00	< LOD : 0.04
105					Negative	1.00	1.00	< LOD : 0.03
105					Negative	2.73	1.00	< LOD : 0.18
105					Negative	1.00	1.00	< LOD : 0.05
105					Negative	1.39	1.00	< LOD : 0.04
105					Negative	1.00	1.00	< LOD : 0.03
105					Negative	1.00	1.00	< LOD : 0.03
105					Negative	1.53	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.06
106					Negative	1.00	1.00	< LOD : 0.04
106					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.03
107					Negative	1.00	1.00	< LOD : 0.04
107					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.34	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.03
108					Negative	1.00	1.00	< LOD : 0.04
109					Negative	1.00	1.00	< LOD : 0.03
109					Negative	1.00	1.00	< LOD : 0.04
109					Negative	1.00	1.00	< LOD : 0.05

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PbC	PbK
< LOD : 0.04	< LOD : 2.21
< LOD : 0.03	< LOD : 2.01
< LOD : 0.03	< LOD : 1.83
< LOD : 0.03	< LOD : 1.84
< LOD : 0.03	< LOD : 3.15
< LOD : 0.03	< LOD : 1.50
< LOD : 0.04	< LOD : 2.78
< LOD : 0.04	< LOD : 1.68
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 1.91
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 2.25
< LOD : 0.03	< LOD : 2.20
< LOD : 0.03	< LOD : 1.89
< LOD : 0.03	< LOD : 1.79
< LOD : 0.03	< LOD : 1.72
< LOD : 0.03	< LOD : 1.37
< LOD : 0.07	< LOD : 3.76
< LOD : 0.04	< LOD : 2.67
< LOD : 0.04	< LOD : 3.16
< LOD : 0.03	< LOD : 1.44
< LOD : 0.18	< LOD : 3.91
< LOD : 0.05	< LOD : 2.71
< LOD : 0.04	< LOD : 2.32
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 2.07
< LOD : 0.03	< LOD : 1.94
< LOD : 0.03	< LOD : 2.27
< LOD : 0.03	< LOD : 1.92
< LOD : 0.03	< LOD : 2.05
< LOD : 0.03	< LOD : 1.78
< LOD : 0.03	< LOD : 2.94
< LOD : 0.06	< LOD : 2.78
< LOD : 0.04	< LOD : 3.04
< LOD : 0.03	< LOD : 1.68
< LOD : 0.03	< LOD : 1.44
< LOD : 0.03	< LOD : 1.95
< LOD : 0.03	< LOD : 1.81
< LOD : 0.03	< LOD : 2.12
< LOD : 0.03	< LOD : 2.19
< LOD : 0.03	< LOD : 2.68
< LOD : 0.03	< LOD : 2.88
< LOD : 0.04	< LOD : 2.71
< LOD : 0.03	< LOD : 2.65
< LOD : 0.03	< LOD : 1.87
< LOD : 0.03	< LOD : 2.15
< LOD : 0.03	< LOD : 2.17
< LOD : 0.03	< LOD : 1.99
< LOD : 0.03	< LOD : 3.00
< LOD : 0.03	< LOD : 2.91
< LOD : 0.04	< LOD : 2.41
< LOD : 0.03	< LOD : 2.72
< LOD : 0.04	< LOD : 2.67
< LOD : 0.05	< LOD : 2.70

NITON Corporation
900 Middlesex Turnpike
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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
379	379	2008-05-06 09:09	PAINT	2.26	mg / cm ^2	Final	WALL	DRYWALL
380	380	2008-05-06 09:09	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
381	381	2008-05-06 09:09	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
382	382	2008-05-06 09:09	PAINT	2.25	mg / cm ^2	Final	WALL	DRYWALL
383	383	2008-05-06 09:10	PAINT	1.12	mg / cm ^2	Final	vent	METAL
384	384	2008-05-06 09:11	PAINT	1.12	mg / cm ^2	Final	vent	METAL
385	385	2008-05-06 09:11	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
386	386	2008-05-06 09:11	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
387	387	2008-05-06 09:11	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
388	388	2008-05-06 09:12	PAINT	1.11	mg / cm ^2	Final	WINDOW sill	WOOD
389	389	2008-05-06 09:12	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
390	390	2008-05-06 09:13	PAINT	1.11	mg / cm ^2	Final	DOOR frame	METAL
391	391	2008-05-06 09:13	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
392	392	2008-05-06 09:14	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
393	393	2008-05-06 09:14	PAINT	1.12	mg / cm ^2	Final	WINDOW sill	WOOD
394	394	2008-05-06 09:15	PAINT	1.13	mg / cm ^2	Final	vent	METAL
395	395	2008-05-06 09:15	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
396	396	2008-05-06 09:15	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
397	397	2008-05-06 09:15	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
398	398	2008-05-06 09:16	PAINT	1.11	mg / cm ^2	Final	WALL	DRYWALL
399	399	2008-05-06 09:17	PAINT	1.13	mg / cm ^2	Final	vent	METAL
400	400	2008-05-06 09:17	PAINT	1.12	mg / cm ^2	Final	cieling rails	METAL
401	401	2008-05-06 09:20	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
402	402	2008-05-06 09:20	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
403	403	2008-05-06 09:20	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
404	404	2008-05-06 09:21	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
405	405	2008-05-06 09:21	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
406	406	2008-05-06 09:22	PAINT	3.36	mg / cm ^2	Final	vent	METAL
407	407	2008-05-06 09:22	PAINT	1.14	mg / cm ^2	Final	duct	METAL
408	408	2008-05-06 09:23	PAINT	1.13	mg / cm ^2	Final	hvac unit	METAL
409	409	2008-05-06 09:24	PAINT	1.66	mg / cm ^2	Final	pipe mount	METAL
410	410	2008-05-06 09:24	PAINT	1.66	mg / cm ^2	Final	WALL	DRYWALL
411	411	2008-05-06 09:24	PAINT	1.13	mg / cm ^2	Final	WALL	DRYWALL
412	412	2008-05-06 09:25	PAINT	1.67	mg / cm ^2	Final	WALL	DRYWALL
413	413	2008-05-06 09:25	PAINT	1.68	mg / cm ^2	Final	WALL	DRYWALL
414	414	2008-05-06 09:25	PAINT	3.37	mg / cm ^2	Final	FLOOR	CONCRETE
415	415	2008-05-06 09:25	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
416	416	2008-05-06 09:26	PAINT	1.12	mg / cm ^2	Final	elect. pnl	METAL
417	417	2008-05-06 09:28	PAINT	3.92	mg / cm ^2	Final	FLOOR	CONCRETE
418	418	2008-05-06 09:30	PAINT	1.12	mg / cm ^2	Final	WINDOW	DRYWALL
419	419	2008-05-06 09:30	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
420	420	2008-05-06 09:31	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
421	421	2008-05-06 09:31	PAINT	1.11	mg / cm ^2	Final	DOOR frame	METAL
422	422	2008-05-06 09:32	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
423	423	2008-05-06 09:32	PAINT	1.13	mg / cm ^2	Final	DOOR	METAL
424	424	2008-05-06 09:33	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
425	425	2008-05-06 09:34	PAINT	1.13	mg / cm ^2	Final	DOOR frame	METAL
426	426	2008-05-06 09:34	PAINT	1.13	mg / cm ^2	Final	DOOR	METAL
427	427	2008-05-06 09:35	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
428	428	2008-05-06 09:35	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
429	429	2008-05-06 09:35	PAINT	1.12	mg / cm ^2	Final	WALL	DRYWALL
430	430	2008-05-06 09:35	PAINT	2.26	mg / cm ^2	Final	WALL	DRYWALL
431	431	2008-05-06 09:36	PAINT	1.15	mg / cm ^2	Final	elect. panel	METAL
432	432	2008-05-06 09:37	PAINT	1.69	mg / cm ^2	Final	cieling rail	METAL

NITON Corporation
900 Middlesex Turnpike
Billerica, MA 01821

Side	Condition	Color	Site	Inspector	Floor	Room
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	silver	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	silver	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	grey	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	RED	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	grey	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	RED	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
B	INTACT	BLUE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	grey	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205

NITON Corporation
900 Middlesex Turnpike
Billerica, MA 01821

Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
109					Negative	1.00	1.00	< LOD : 0.03
109					Negative	1.00	1.00	< LOD : 0.03
109					Negative	1.50	1.00	< LOD : 0.04
109					Negative	1.00	1.00	< LOD : 0.03
109					Negative	1.58	1.00	< LOD : 0.05
109 108 entry					Negative	1.00	1.00	< LOD : 0.04
109 108 entry					Negative	1.00	1.00	< LOD : 0.03
109 108 entry					Negative	1.00	1.00	< LOD : 0.03
109 108 entry					Negative	1.00	1.00	< LOD : 0.03
109 108 entry					Negative	1.00	1.00	< LOD : 0.04
109 108 entry					Negative	1.00	1.00	< LOD : 0.03
109 108 entry					Negative	1.00	1.00	< LOD : 0.03
110					Negative	4.54	1.00	< LOD : 0.24
110					Negative	1.00	1.00	< LOD : 0.04
110					Negative	1.00	1.00	< LOD : 0.05
110					Negative	1.00	1.00	< LOD : 0.03
110					Negative	1.00	1.00	< LOD : 0.03
110					Negative	1.00	1.00	< LOD : 0.03
110					Negative	1.00	1.00	< LOD : 0.03
110					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.05
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.09
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	4.05	1.00	< LOD : 0.10
120a					Negative	3.98	1.00	< LOD : 0.09
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.03
120a					Negative	1.00	1.00	< LOD : 0.04
120a					Negative	1.00	1.00	< LOD : 0.45
120					Negative	1.78	1.00	< LOD : 0.03
120					Negative	1.00	1.00	< LOD : 0.03
120					Negative	4.15	1.00	< LOD : 0.21
120					Negative	1.00	1.00	< LOD : 0.06
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	4.93	1.00	< LOD : 0.19
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03

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PbC	PbK
< LOD : 0.03	< LOD : 1.77
< LOD : 0.03	< LOD : 2.03
< LOD : 0.04	< LOD : 2.09
< LOD : 0.03	< LOD : 1.65
< LOD : 0.05	< LOD : 2.33
< LOD : 0.04	< LOD : 2.17
< LOD : 0.03	< LOD : 1.64
< LOD : 0.03	< LOD : 2.16
< LOD : 0.03	< LOD : 2.24
< LOD : 0.04	< LOD : 3.16
< LOD : 0.03	< LOD : 2.58
< LOD : 0.03	< LOD : 3.32
< LOD : 0.24	< LOD : 3.75
< LOD : 0.04	< LOD : 2.80
< LOD : 0.05	< LOD : 2.82
< LOD : 0.03	< LOD : 2.23
< LOD : 0.03	< LOD : 2.06
< LOD : 0.03	< LOD : 2.09
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 2.04
< LOD : 0.03	< LOD : 2.18
< LOD : 0.03	< LOD : 2.00
< LOD : 0.05	< LOD : 2.87
< LOD : 0.03	< LOD : 3.90
< LOD : 0.03	< LOD : 2.01
< LOD : 0.03	< LOD : 2.08
< LOD : 0.03	< LOD : 1.86
< LOD : 0.03	< LOD : 1.20
< LOD : 0.09	< LOD : 2.73
< LOD : 0.03	< LOD : 3.42
< LOD : 0.10	< LOD : 1.80
< LOD : 0.09	< LOD : 1.65
< LOD : 0.03	< LOD : 2.26
< LOD : 0.03	< LOD : 2.00
< LOD : 0.03	< LOD : 1.91
< LOD : 0.03	< LOD : 2.08
< LOD : 0.04	< LOD : 2.67
< LOD : 0.45	< LOD : 3.60
< LOD : 0.03	< LOD : 1.20
< LOD : 0.03	< LOD : 2.44
< LOD : 0.21	< LOD : 2.55
< LOD : 0.06	< LOD : 3.68
< LOD : 0.03	< LOD : 3.66
< LOD : 0.03	< LOD : 2.91
< LOD : 0.03	< LOD : 3.29
< LOD : 0.03	< LOD : 3.67
< LOD : 0.03	< LOD : 3.51
< LOD : 0.03	< LOD : 3.53
< LOD : 0.03	< LOD : 1.62
< LOD : 0.03	< LOD : 2.48
< LOD : 0.19	< LOD : 2.33
< LOD : 0.03	< LOD : 1.65
< LOD : 0.03	< LOD : 4.20
< LOD : 0.03	< LOD : 1.76

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Index	Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate
433	433	2008-05-06 09:37	PAINT	1.13	mg / cm ^2	Final	vent	METAL
434	434	2008-05-06 09:38	PAINT	1.68	mg / cm ^2	Final	vent	METAL
435	435	2008-05-06 09:41	PAINT	1.68	mg / cm ^2	Final	wall	plastic
436	436	2008-05-06 09:43	PAINT	1.66	mg / cm ^2	Final	wall	plastic
437	437	2008-05-06 09:44	PAINT	1.14	mg / cm ^2	Final	wall	DRYWALL
438	438	2008-05-06 09:44	PAINT	1.13	mg / cm ^2	Final	wall	DRYWALL
439	439	2008-05-06 09:44	PAINT	1.69	mg / cm ^2	Final	wall	DRYWALL
440	440	2008-05-06 09:44	PAINT	1.12	mg / cm ^2	Final	wall	DRYWALL
441	441	2008-05-06 09:45	PAINT	1.12	mg / cm ^2	Final	DOOR	WOOD
442	442	2008-05-06 09:45	PAINT	1.12	mg / cm ^2	Final	DOOR frame	METAL
443	443	2008-05-06 09:56	PAINT	1.14	mg / cm ^2	Final	gutter	METAL
444	444	2008-05-06 09:56	PAINT	1.14	mg / cm ^2	Final	gutter	METAL
445	445	2008-05-06 09:57	PAINT	1.12	mg / cm ^2	Final	roof trim	METAL
446	446	2008-05-06 10:02	PAINT	1.13	mg / cm ^2	Final	roof trim	METAL
447	447	2008-05-06 10:03	PAINT	1.13	mg / cm ^2	Final	roof	METAL
448	448	2008-05-06 10:03	PAINT	1.67	mg / cm ^2	Final	roof peak	METAL
449	449	2008-05-06 10:29	PAINT	6.14	mg / cm ^2	Final	WINDOW	METAL
450	450	2008-05-06 10:30	PAINT	5.60	mg / cm ^2	Final	WINDOW	METAL
451	451	2008-05-06 10:31	PAINT	7.27	mg / cm ^2	Final	WINDOW	METAL
452	452	2008-05-06 10:31	PAINT	5.07	mg / cm ^2	Final	WINDOW	METAL
453	453	2008-05-06 10:32	PAINT	6.14	mg / cm ^2	Final	WINDOW	METAL
454	454	2008-05-06 10:32	PAINT	1.68	mg / cm ^2	Final	WINDOW	METAL
455	455	2008-05-06 10:39	PAINT	3.35	mg / cm ^2	Final	door vent	METAL
456	456	2008-05-06 10:40	PAINT	1.13	mg / cm ^2	Final	DOOR	WOOD
457	457	2008-05-06 10:40	PAINT	1.12	mg / cm ^2	Final	WALL	WOOD
458	458	2008-05-06 10:40	PAINT	1.13	mg / cm ^2	Final	WALL	WOOD
459	459	2008-05-06 10:40	PAINT	1.11	mg / cm ^2	Final	WALL	WOOD
460	460	2008-05-06 10:40	PAINT	1.13	mg / cm ^2	Final	WALL	WOOD
461	461	2008-05-06 10:41	PAINT	5.02	mg / cm ^2	Final	WINDOW	METAL
462	462	2008-05-06 10:41	PAINT	3.90	mg / cm ^2	Final	WINDOW	METAL
463	463	2008-05-06 10:42	PAINT	1.13	mg / cm ^2	Final	WINDOW sill	WOOD
464	464	2008-05-06 10:42	PAINT	1.13	mg / cm ^2	Final	WINDOW sill	WOOD
465	465	2008-05-06 10:43	PAINT	2.23	mg / cm ^2	Final	vent	METAL
466	466	2008-05-06 10:45	PAINT	20.00	mg / cm ^2	Final		
467	467	2008-05-06 10:46	PAINT	20.00	mg / cm ^2	Final		

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Side	Condition	Color	Site	Inspector	Floor	Room
D	INTACT	silver	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	silver	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BLUE	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
D	INTACT	WHITE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BEIGE	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	silver	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	silver	nasa stennis mississippi	scott drinko	out	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
C	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
D	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
B	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
A	INTACT	BROWN	nasa stennis mississippi	scott drinko	in	3205
UPPER	INTACT	WHITE	nasa stennis mississippi	scott drinko	in	3205
CALIBRATE			**nasa stennis mississippi**	**scott drinko**		**3205**
CALIBRATE			**nasa stennis mississippi**	**scott drinko**		**3205**

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Misc 1	Misc 2	Res	EScale1	EscleCT	Results	Depth Index	Action Level	PbL
121					Negative	1.00	1.00	< LOD : 0.03
121					Negative	1.00	1.00	< LOD : 0.03
117 mensbath					Negative	1.00	1.00	< LOD : 0.03
117 womens bath					Negative	1.00	1.00	< LOD : 0.03
115					Negative	1.00	1.00	< LOD : 0.03
115					Negative	1.00	1.00	< LOD : 0.03
115					Negative	1.00	1.00	< LOD : 0.03
115					Negative	1.00	1.00	< LOD : 0.03
115					Negative	1.29	1.00	< LOD : 0.08
115					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.04
					Negative	1.00	1.00	< LOD : 0.05
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
					Negative	1.00	1.00	< LOD : 0.03
102					Negative	1.00	1.00	< LOD : 0.03
103					Negative	2.12	1.00	< LOD : 0.03
104					Negative	1.00	1.00	< LOD : 0.03
105					Negative	1.46	1.00	< LOD : 0.03
106					Negative	2.02	1.00	< LOD : 0.03
106					Negative	1.00	1.00	< LOD : 0.03
cubicle area					Negative	1.00	1.00	< LOD : 0.03
101					Negative	1.00	1.00	< LOD : 0.03
101					Negative	1.00	1.00	< LOD : 0.03
101					Negative	1.00	1.00	< LOD : 0.03
101					Negative	4.15	1.00	< LOD : 0.22
101					Negative	1.00	1.00	< LOD : 0.03
101					Negative	1.00	1.00	< LOD : 0.03
101					Negative	5.89	1.00	< LOD : 0.09
101					Negative	1.00	1.00	< LOD : 0.05
101					Negative	1.00	1.00	< LOD : 0.04
101					Negative	1.00	1.00	< LOD : 0.03
					Positive	**1.08**	**1.00**	**1.00 ± 0.10**
					Positive	**2.47**	**1.00**	**1.00 ± 0.10**

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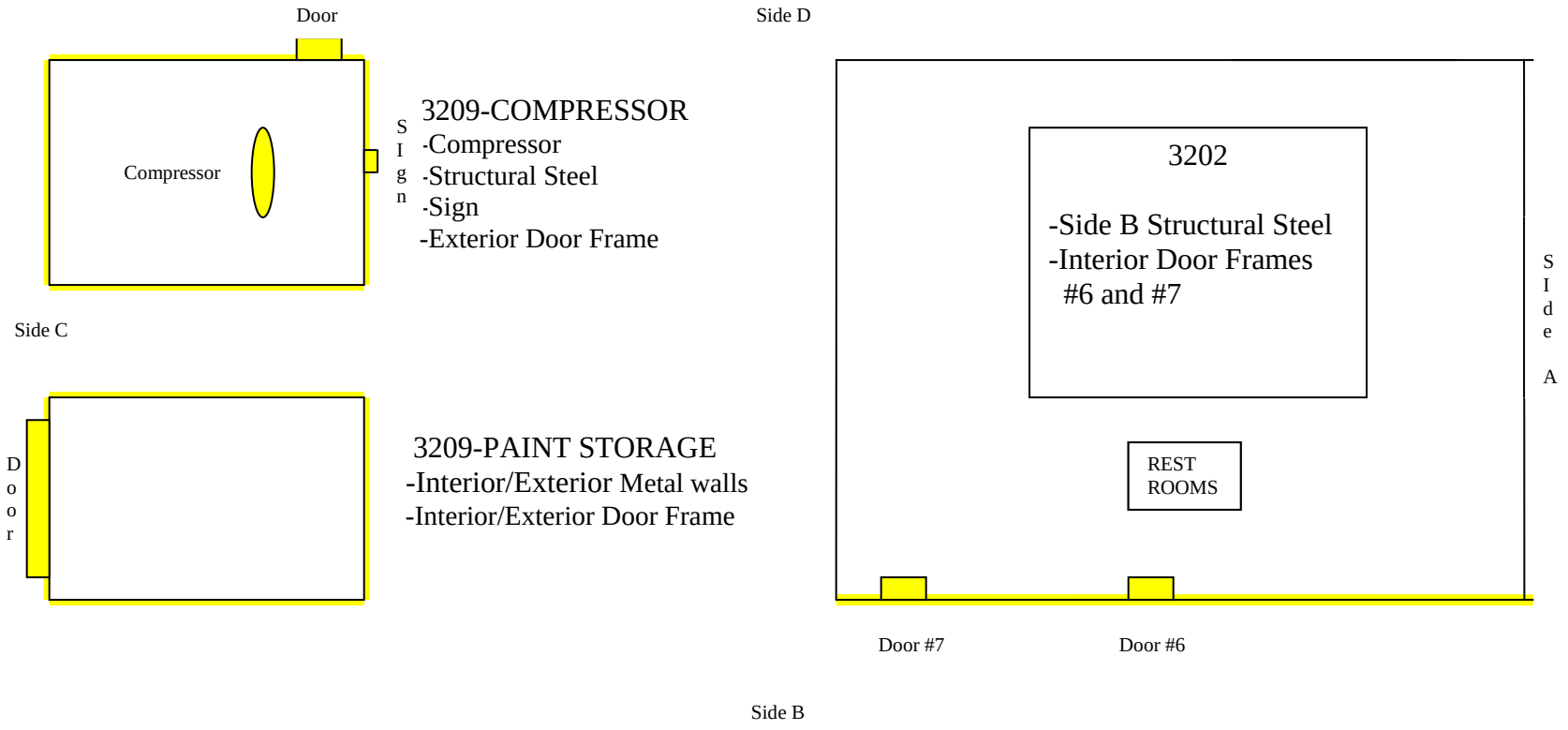
PbC	PbK
< LOD : 0.03	< LOD : 4.18
< LOD : 0.03	< LOD : 1.80
< LOD : 0.03	< LOD : 1.72
< LOD : 0.03	< LOD : 1.78
< LOD : 0.03	< LOD : 2.03
< LOD : 0.03	< LOD : 1.91
< LOD : 0.03	< LOD : 1.95
< LOD : 0.03	< LOD : 2.18
< LOD : 0.08	< LOD : 2.85
< LOD : 0.03	< LOD : 3.67
< LOD : 0.05	< LOD : 3.48
< LOD : 0.04	< LOD : 3.24
< LOD : 0.05	< LOD : 3.09
< LOD : 0.03	< LOD : 2.85
< LOD : 0.03	< LOD : 2.77
< LOD : 0.03	< LOD : 1.81
< LOD : 0.03	< LOD : 0.75
< LOD : 0.03	0.90 ± 0.50
< LOD : 0.03	< LOD : 0.75
< LOD : 0.03	< LOD : 0.90
< LOD : 0.03	< LOD : 0.75
< LOD : 0.03	< LOD : 1.94
< LOD : 0.03	< LOD : 0.93
< LOD : 0.03	< LOD : 2.85
< LOD : 0.03	< LOD : 1.72
< LOD : 0.03	< LOD : 2.00
< LOD : 0.22	< LOD : 1.80
< LOD : 0.03	< LOD : 1.90
< LOD : 0.03	< LOD : 0.90
< LOD : 1.00	< LOD : 1.00
< LOD : 0.05	< LOD : 2.85
< LOD : 0.04	< LOD : 2.85
< LOD : 0.03	< LOD : 1.65
1.00 ± 0.10	**0.70 ± 0.30**
1.00 ± 0.10	**0.70 ± 0.30**

APPENDIX A

BUILDING PLAN IDENTIFYING LBP LOCATIONS

LBP LOCATIONS

NASA STENNIS, MISSISSIPPI



APPENDIX B

CREDENTIALS AND LICENSES

United States Environmental Protection Agency

This is to certify that

BAT Associates, Inc

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402(a)(1), and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226.

In the Jurisdiction of:

Florida

This certification is valid from the date of issuance and expires May 8, 2011

FL-16451-1

Certification #

MAY 13 2008

Issued On

Jeaneanne M. Gettle, Chief

Pesticides and Toxic Substances Branch

ABIH

american board of industrial hygiene®

organized to improve the practice of industrial hygiene
proclaims that

William J. Max

having met all requirements through
education, experience and examination,
is hereby certified in the

COMPREHENSIVE PRACTICE
of
INDUSTRIAL HYGIENE

and has the right to use the designations

CERTIFIED INDUSTRIAL HYGIENIST

CIH

Certificate Number: 6949 CP

Awarded: December 4, 1995

Expiration Date: June 1, 2012

Barbara J Dawson
Chairman ABIH

Lynn C. O'Donnell
Executive Director ABIH

The Environmental Institute

Scott Drinko

Social Security Number - 026-62-8107
BAT Associates - 5151 Brook Hollow Parkway, Suite 250 - Norcross, Georgia 30177

Has completed coursework and satisfactorily passed the hands-on skills assessment and an examination that meets training criteria in accordance with requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities as regulated by Georgia DNR/EPD Chapter 391-3-24 and U. S. EPA TSCA 40 CFR Part 745 for the refresher course titled

Lead Inspector Refresher

February 19, 2008
Course Date

1242
Certificate Number

February 19, 2008
Examination Date

February 18, 2010
Expiration Date (per Georgia)

February 18, 2011
Expiration Date (per EPA)



Bonnie B. Maurras - Principal Instructor

David W. Hogue - Training Manager

TEI - 1841 West Oak Parkway, Suite F - Marietta, GA 30062 - (770) 427-3600 - www.tei-atl.com

(State of Georgia Accredited - Certification No. 20-0799-006SR - September 21, 1999)

MISSISSIPPI STATE DEPARTMENT OF HEALTH

May 1, 2008

Scott Drinko, RSO
BAT Associates, Inc.
5151 Brook Hollow Parkway
Suite 250
Norcross, Georgia 30071

Fee Expiration Date:
April 30, 2009

Dear Mr. Drinko:

Pursuant to Section 300.26 of the Mississippi State Board of Health Regulations for Control of Radiation, you are hereby granted reciprocal recognition of your Georgia Radioactive Materials License No. GA-1472-1 for conducting licensed activities in the state of Mississippi. This authorization is effective from **May 1, 2008** through **April 30, 2009.** If the licensed activities exceed 180 days in a calendar year, an application for a specific license must be submitted to this Agency. Prior notification of entry into the state of Mississippi to perform licensed activities must be provided to this Office.

Notifications must include the proposed place of use, dates, time, authorized users, client contact name and telephone number, radioactive device serial number, radioactive material used, activity, and the directions to the proposed place of use. **Please FAX all reciprocity notifications to 601-987-6887.** For jobs that last more than one (1) week, you must submit an updated notification for each week.

If you should have any questions concerning this letter, please contact our Office at (601) 987-6893.

Sincerely,

B. J. Smith, Director
Division of Radiological Health

570 East Woodrow Wilson • Post Office Box 1700 • Jackson, Mississippi 39215-1700
601/576-7634 • Fax 601/576-7931 • www.HealthyMS.com
Equal Opportunity In Employment/Service

Certificate of Achievement

Scott Drinko
BAT Associates

Has successfully completed the
Thermo Fisher Scientific NITON Analyzers Manufacturer's Training Course
and is now certified in radiation safety and monitoring, device operation,
and machine maintenance of the ***NITON XRF Analyzer.***
Certificate issued by Thermo Fisher Scientific NITON Analyzers
(CIH's – The ABIH Awards 1 CM point, approval # 07-1596)

ThermoFisher
SCIENTIFIC



Victoria Grzybinski

Training Coordinator

Kenneth P. Ward

Director of Training

00v3000000DpFY6

Certificate Number

2007 Nov 27 / Macon, GA

Date & Site of Course

APPENDIX C

SUPPLEMENTAL DOCUMENTATION

Niton XRF Performance Characteristic Sheets

Performance Characteristic Sheet

EFFECTIVE DATE: **September 24, 2004** **EDITION NO.: 1**

MANUFACTURER AND MODEL:

Make: *Niton LLC*

Tested Model: *XLp 300*

Source: ^{109}Cd

Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.

XLp 300A, XLp 301A, XLp 302A and XLp 303A.

XLi 700A, XLi 701A, XLi 702A and XLi 703A.

XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm^2 (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm^2 in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm^2 film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is <u>not</u> needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)

	All Data			Median for laboratory-measured lead levels (mg/cm^2)		
Substrate	25th Percentile	Median	75th Percentile	Pb < 0.25	0.25 ≤ Pb<1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) LEAD TESTING

for

Buildings 3202, 3205 and 3209
NASA Stennis Space Center
Mississippi

Prepared for:
The Mason & Hanger Group, Inc.
300 W. Vine Street, Suite 1300
Lexington, KY 40507-1814

Prepared by:
BAT Associates, Inc.
5151 Brook Hollow Parkway
Suite 250
Norcross, GA 30071

June 5, 2008

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
LEAD TESTING
BUILDINGS 3202, 3205 AND 3209
NASA STENNIS SPACE CENTER
MISSISSIPPI

BAT Associates, Inc. (BAT) conducted a Lead-Based Paint (LBP) and Lead Containing Component (LCC) inspection at NASA Stennis Space Center, Mississippi on May 4 and 5, 2008. BAT did not find any LCCs. All identified LBP was located on recyclable metal components. TCLP samples were not taken, as these materials will not be represented in the waste stream.

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 4

Fire Protection
Hydrant Flow Test Report

Hydrant Flow Test Report

Location Bldg 3202 - Stennis Space Center
Date 4/25/2008
Test made by David L. Miller, P.E. & Darrell
Time 11:15 A.M.
Representative of Engineered Fire Protection, LLC
11920 Richcroft Avenue
Baton Rouge, Louisiana 70814
225-273-5040

Witness Mark Mick
Purpose of test

Read Hydrant

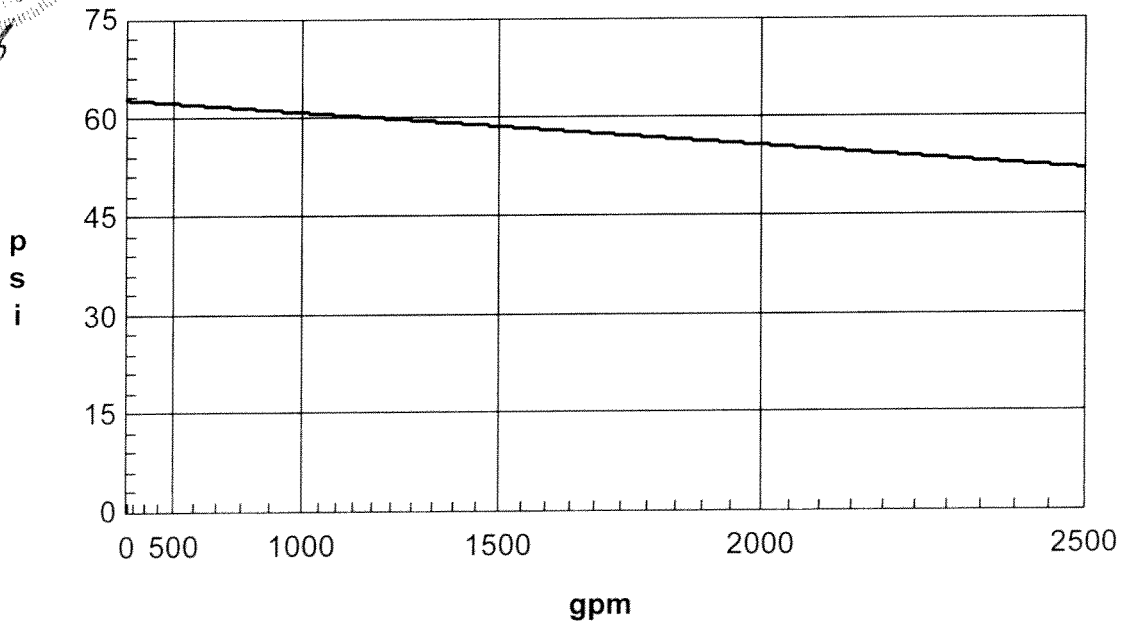
Static pressure 63 psi
Residual pressure 60 psi
Elevation 2 ft

Flow Hydrant

Nozzle size 2.5 in
Discharge coefficient 0.90
Elevation 2 ft
Pitot pressure 56 psi
Nozzle Fill 100%
Flow 1256 gpm

STATE OF LOUISIANA
DAVID L. MILLER
License No. 23505
PROFESSIONAL ENGINEER
& FIRE PROTECTION ENGINEER
4/25/08

Flow Graph



Created with the free hydrant flow test program from www.igneusinc.com

STATE OF LOUISIANA
DAVID L. MILLER
License No 23505
PROFESSIONAL ENGINEER
& FIRE PROTECTION ENGINEER
4/25/08



BUILDING
3202



HYDRANT #51
2½" BUTT
PITOT PRESSURE: 56 PSI
FLOW: 1256 GPM

HYDRANT #52

STATIC PRESSURE: 63 PSI
RESIDUAL PRESSURE: 60 PSI

TEST DATE: 4-25-08
TEST TIME: 11:15 A.M.

Hydrant Flow Test
Building 3202
John C. Stennis Space Center

FILE NO.: FLOW TESTS. DWG	SHEET: 2 of 2
DATE: APRIL 25, 2008	SCALE: NTS

ENGINEERED FIRE PROTECTION, LLC

DAVID L. MILLER, P.E.

11920 Richcroft Avenue
Baton Rouge, Louisiana 70814
(225) 273-5040 Fax: (225) 275-2535
E-mail: dlm@EngFirePro.com

FLOW TEST SUMMARY

NAME OF PERSON(S) PERFORMING TEST:

Darrell Juneau

CONTRACT # 70049

ADDRESS:
John C. Stennis Space Ctr
SSC, Ms. 39529-6000

DATE 4-25-08 TIME: 11:15

RESULTS OF FLOW TEST #1:

STATIC: 63 # AT HYDRANT # 52

RESIDUAL: 60 # AT HYDRANT # 52

FLOW: PITOT 56 # GPM 1255 AT HYDRANT # 51

RESULTS OF FLOW TEST #2:

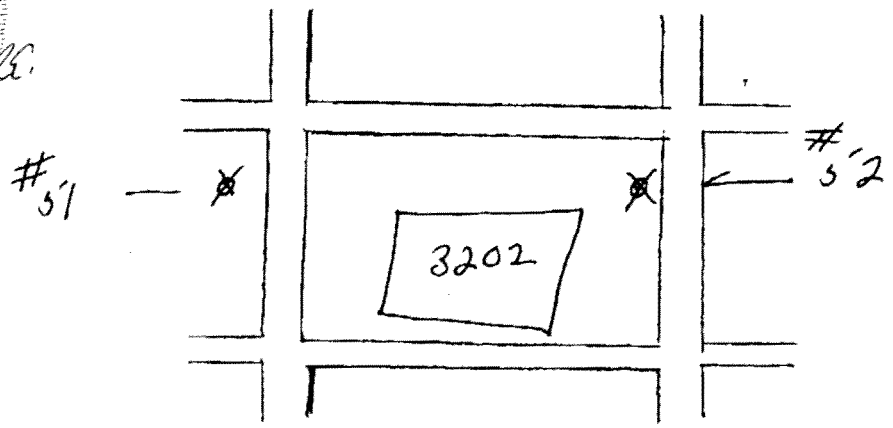
STATIC: _____ AT HYDRANT #_____

RESIDUAL: _____ AT HYDRANT #_____

FLOW: PITOT_____ GPM_____ AT HYDRANT #_____

ADDITIONAL COMMENTS:

STATE OF LOUISIANA
DAVID L. MILLER
License No. 23505
PROFESSIONAL ENGINEER
FIRE PROTECTION ENGINEERING
David L. Miller P.E.
4/25/08



Hydrant Flow Test Report

Location	Bldg 3205 - Stennis Space Center	**Date**	4/25/2008
Test made by	David L. Miller, P.E. & Darrell	**Time**	10:50 A.M.
Representative of	Engineered Fire Protection, LLC 11920 Richcroft Avenue Baton Rouge, Louisiana 70814 225-273-5040		
Witness	Mark Mick		
Purpose of test			

Read Hydrant

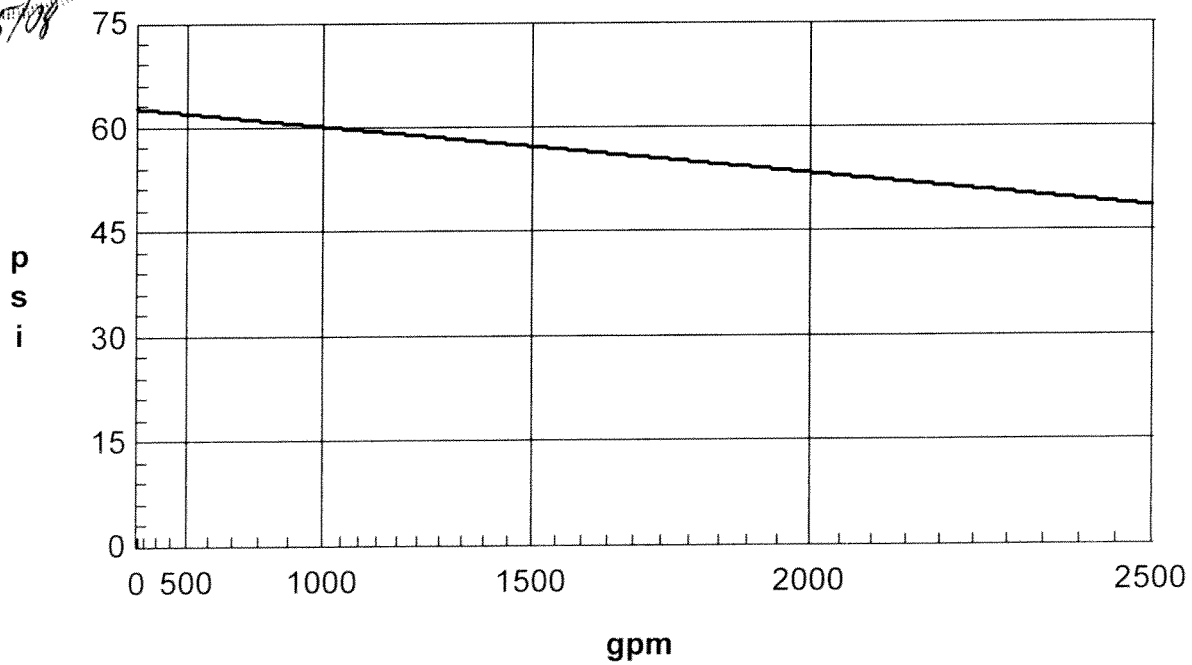
Static pressure 63 psi
Residual pressure 59 psi
Elevation 3 ft

Flow Hydrant

Nozzle size 2.5 in
Discharge coefficient 0.90
Elevation 3 ft
Pitot pressure 56 psi
Nozzle Fill 100%
Flow 1256 gpm

STATE OF LOUISIANA
DAVID L MILLER
License No 23505
PROFESSIONAL ENGINEER
David L. Miller P.E.
FIRE PROTECTION ENGINEER
4/28/08

Flow Graph



Created with the free hydrant flow test program from www.igneusinc.com

STATE OF LOUISIANA
DAVID L. MILLER
License No. 23505
PROFESSIONAL ENGINEER
FIRE PROTECTION
4/25/08

HYDRANT #47
2½" BUTT
PITOT PRESSURE: 56 PSI
FLOW: 1256 GPM

BUILDING 3205

HYDRANT #46

STATIC PRESSURE: 63 PSI
RESIDUAL PRESSURE: 59 PSI



NASA

TEST DATE: 4-25-08
TEST TIME: 10:50 A.M.

Hydrant Flow Test
Building 3205
John C. Stennis Space Center

FILE NO.: FLOW TESTS. DWG	SHEET: 1 of: 2
DATE: APRIL 25, 2008	SCALE: NTS

ENGINEERED FIRE PROTECTION, LLC

DAVID L. MILLER, P.E.

11920 Richcroft Avenue
Baton Rouge, Louisiana 70814
(225) 273-5040 Fax: (225) 275-2535
E-mail: dlm@EngFirePro.com

FLOW TEST SUMMARY

NAME OF PERSON(S) PERFORMING TEST:

Darrell Tunery

CONTRACT # 70049

ADDRESS:
John C. Stennis Space CTR.
SSC, MS. 39529-6000

DATE 4-25-08 TIME: 10:50 A.M.

RESULTS OF FLOW TEST #1:

STATIC: 63 AT HYDRANT # 46

RESIDUAL: 59 AT HYDRANT # 46

FLOW: PITOT 56 GPM 1255 AT HYDRANT # 47

RESULTS OF FLOW TEST #2:

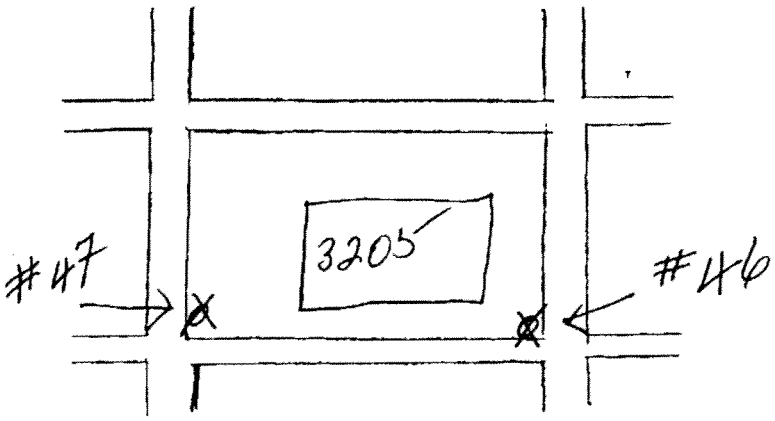
STATIC: _____ AT HYDRANT # _____

RESIDUAL: _____ AT HYDRANT # _____

FLOW: PITOT _____ GPM _____ AT HYDRANT # _____

ADDITIONAL COMMENTS:

STATE OF LOUISIANA
DAVID L. MILLER
License No 23505
PROFESSIONAL ENGINEER
David L. Miller P.E.
4/25/08



STANDARD INSTRUMENT SERVICE
P.O. Box 473
HARVEY, LOUISIANA
TELEPHONE 367-4195

CALIBRATION CERTIFICATE

This is to certify that this instrument has been inspected and calibrated.

Serial No. S/N# 0549
Size 3 1/2
Mfg. ASHCROFT
Range 0-300 PSI

APPLIED	INDICATED
50	55
100	100
150	148
200	195
250	240

TYPE TESTER USED: ASHCROFT DW TESTER TYPE 1312
DATE TESTED: 1-30-08 BY: [signature]

This Instrument was calibrated with standards which are accurate and traceable to "THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY"
N.I.S.T. numbers 167720 and 174192

Room Temp. 72 F.
Calibrated In VERTICAL Position

STANDARD INSTRUMENT SERVICE
P.O. Box 473
HARVEY, LOUISIANA
TELEPHONE 367-4195

CALIBRATION CERTIFICATE

This is to certify that this instrument has been inspected and calibrated.

Serial No. S/N 13008
Size 3½
Mfg. ASHCROFT
Range 0-100 PSI

APPLIED	INDICATED
20	19.5
40	39.5
60	59
80	79

TYPE TESTER USED: ASHCROFT D/W TESTER TYPE 1312
DATE TESTED: 1-30-08 BY: [signature]

This Instrument was calibrated with standards which are accurate and traceable to "THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY"
N.I.S.T. numbers 167720 and 174192

Room Temp. 78° F.
Calibrated In W Rights Position

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 5

NDBC Machine & Welding Shop Data

Machine Shop Equipment List

Machine & Welding Shop Layout

Relocate From Building 3203

Equipment to move (W x L x H):

- Manual Lathe – 5’ x 9’ x 5’-6” 440V-30 amps –Clausing Industrial, Inc. CD0000451134
- Hydraulic Break – 5’ x 7’ x 7’ 230V-30 amps – Acurpress CD0000451370
- CNC Milling Machine – 7’ x 9’ x 10’ 5280lb 208/240V-20 amps comp. air hookup – HAAS CD0000768871
- Radial Arm Drill 9’ x 7’ x 10’ 220/440V-15/15amps – JET NDBC 29148
- Large Lathe 12’ x 6’ x 5’ 440V-30amps – Standard Lodge & Shipley NDBC 30222
- Hydraulic Shear 8’ x 12’ x 8’ 220/440V-50 amps – Betenbender
- Iron Worker 3’ x 6’ x 6’ 220V-20 amps – GEKA NDBC 29818
- Chop Saw – 14 ½’ x 5 ½’ x 6’ with roller support extending 12’ from end of saw frame – CD0000451293
- Pedestal Grinder (6”) 208/240VAC 3ph – 20 Amp

Note: Compressed Air station needed between every other Machine

New Government Purchased Equipment

List of GSA Equipment to be purchased for B3202

- CNC Water Jet Cutter, 10’ x 5’, 30 HP Pump
  Part No. 51030
  Contractor: Fox Machinery Associated, Inc.
  Contract No. GS-06F0005P
  Dimensions:
  Table 145” x 94” x 60”, Intensifier 68” x 48” x 48”, Control Console 34” x 24” x 36”
  Approximate Weight: 10,000 Lbs Maximum
  Requirements:
  1. 460/480VAC 3ph – 60 Amp (for pump)
  2. 460/480VAC 1ph – 20 Amp or 208/230VAC 1ph – 30 Amp (for console)
  3. Water Supply – 60 psi and 5 gpm minimum
  4. Water Drain – 5 gpm
  5. Dry Shop Air of 90 psi and 6 cfm minimum
  6. Network Drop

  Options Desired:
  1. REMP011 Remoter Operator Pendant
  2. EXWA011 2nd Year Limited Warranty
  3. 1KBD0011 Industrial Keyboard (Sealed)
  4. CBAC011 Cabinet Air Conditioner

- CNC Vertical Mill
  Part No. TM-3P
  Contractor: Phillips Corp.
  Contract No. GS-07F-7729C
  Dimensions: 40” x 20” x 16”
  Approximate Weight: 6,000 Lbs
  Requirements:
  1. 208/240VAC 3ph – 30 Amp

- CNC Lathe
  Part No. TL-3
  Contractor: Phillips Corp.
  Contract No. GS-07F-7729C
  Dimensions: 118” x 62” x 56”
  Approximate Weight: 6,500 Lbs
  Requirements:
    1. 220/240VAC 3ph – 50 Amp

- Gap Bed Lathe 20” x 87”
  Part No. C2087SS
  Contractor: Clausing Industrial, Inc.
  Contract No. GS-07F-7554C
  Dimensions: 142” x 42” x 58”
  Approximate Weight: 5,600 Lbs
  Requirements:
    1. 460/480VAC 3ph – 30 Amp

- Vertical Band Saw
  Part No. DOL-90184M
  Contractor: J&L America, Inc.
  Contract No. GS-06F-0074M
  Dimensions: 26” x 26” x 78”
  Approximate Weight: 3,5000 Lbs
  Requirements:
    1. 460/480VAC 3ph – 5 Amp

- Horizontal Band Saw
  Part No. SCO SHA1419
  Contractor: Cuna Industrial Supply & Logistics, Inc.
  Contract No. GS-06F-0006T
  Dimensions: 64” x 32” x 40”
  Approximate Weight: 2,000 Lbs
  Requirements:
    1. 460/480VAC 3ph – 5 Amp

- Drill Press
  Part No. A15-344
  Contractor: W.S. Jenks & Son
  Contract No. GS-06F-0046M
  Dimensions: 36” x 36” x 78”
  Approximate Weight: 800 Lbs
  Requirements:
    1. 460/480VAC 3ph – 5 Amp

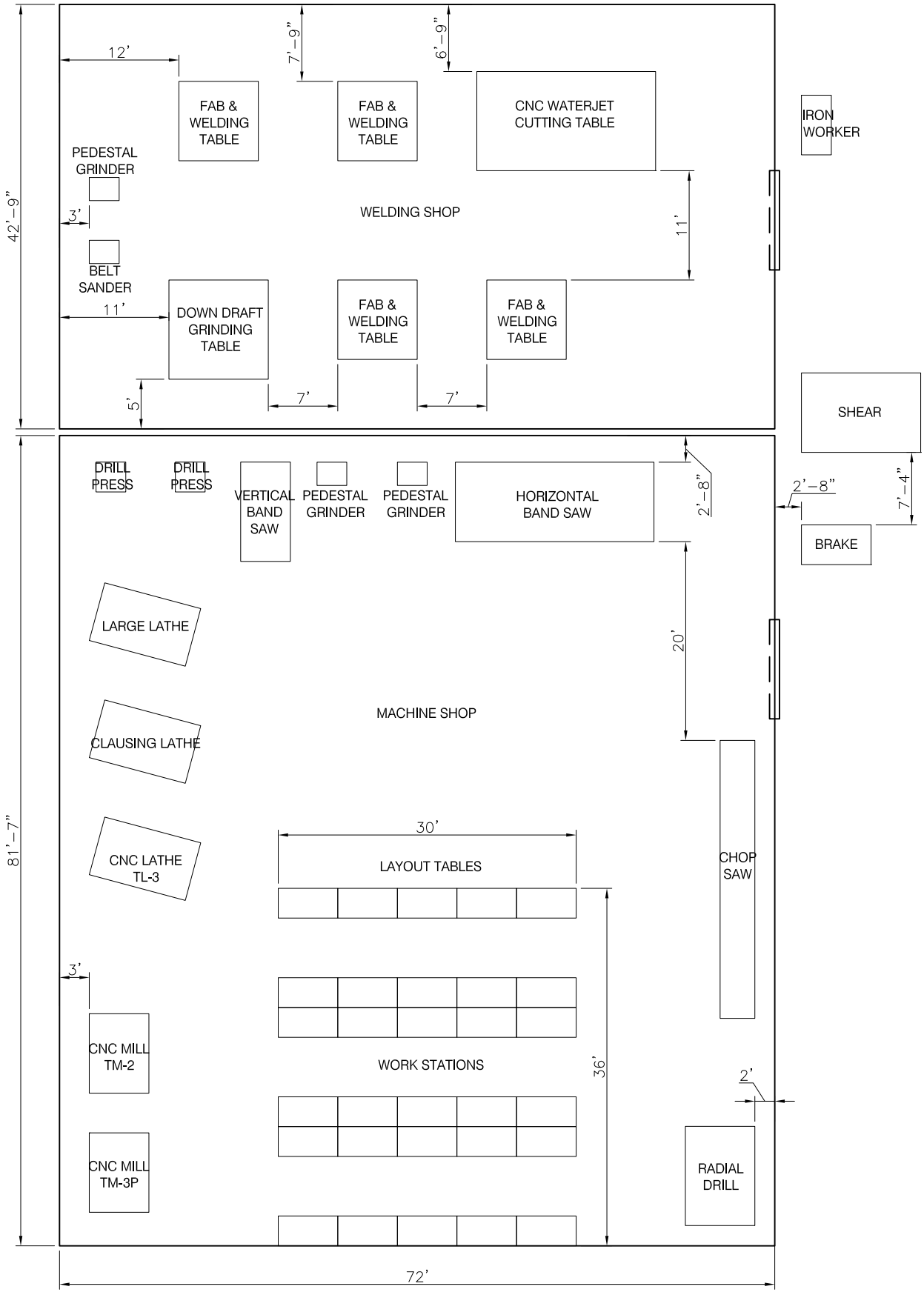
- Down Draft Table
  Part No. 9600B3PH
  Contractor: W.S. Jenks & Son
  Contract No. GS-06F-0046M
  Dimensions: 96” x 48” x 36”
  Approximate Weight: 1,800 Lbs
  Requirements:
    1. 460/480VAC 3ph – 10 Amp

- Pedestal Grinders (10” and 6”)
  Dimensions: 36” x 28” x 56”
  Approximate Weight: 400 Lbs
  Requirements:
    1. 208/240VAC 3ph – 20 Amp

- Belt Sander (6” wide)
  Dimensions: 28” x 20” x 58”
  Approximate Weight: 400 Lbs
  Requirements:
    1. 208/240VAC 3ph – 20 Amp

Other Requirements:

- Workstations (25) 6’ x 3’ 110V-15 amp services
- Layout Tables (5) 6’ x 3’
- Tool Room 20’ x 20’ x 8’ (shelving)
- All Welding – 440V-50 amps
- Computer Room (Break Area)


42'–9"
12'
7'–9"
6'–9"
FAB & WELDING TABLE
FAB & WELDING TABLE
CNC WATERJET CUTTING TABLE
IRON WORKER
PEDESTAL GRINDER
3'
WELDING SHOP
11'
BELT SANDER
11'
DOWN DRAFT GRINDING TABLE
FAB & WELDING TABLE
FAB & WELDING TABLE
5'
7'
7'
SHEAR
DRILL PRESS
DRILL PRESS
VERTICAL BAND SAW
PEDESTAL GRINDER
PEDESTAL GRINDER
HORIZONTAL BAND SAW
2'–8"
2'–8"
7'–4"
BRAKE
LARGE LATHE
20'
MACHINE SHOP
CLAUSING LATHE
81'–7"
30'
CNC LATHE TL-3
LAYOUT TABLES
CHOP SAW
3'
CNC MILL TM-2
WORK STATIONS
36'
2'
CNC MILL TM-3P
RADIAL DRILL
72'

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 6

NDBC, Paint Data

Paint Data Sheets, Present Use

Paint Data Sheets, Future Use

MC-CR 100 *Present*

WASSER

Product Description:

This corrosion resistant intermediate coating is a versatile overcoat product that shows superior adhesion to various substrates. MC-CR 100 has aromatic chemical resistant properties and offers outstanding barrier film protection under recommended topcoats. It provides a smoother surface for topcoat application over zinc and micaceous iron oxide (MIO) primers and is recommended for application when lighter color topcoats are desired. MC-CR 100 is also Wasser's standard MCU primer for concrete.

Area of Use

Substrates

Over properly prepared:

- Ferrous Metal
- Galvanized Metal
- Aluminum/Non-Ferrous Metal
- Previously Existing Coatings
- Concrete
- Concrete Block

Possible Uses

- Bridges
- Tanks
- Material Handling Equipment
- Pulp and Paper Mills
- Chemical Processing Facilities
- Pipes
- Water and Wastewater Treatment Facilities
- Structural Steel
- Food Processing Facilities
- Refineries
- Dry Holds/Wet Holds
- Concrete Structures
- Floors

Ready Reference Information

Resin Type:	Aromatic Urethane
Pigment Type:	Coloring and Anticorrosive
Sheen:	Flat
Colors:	Buff or Off-White
Volume Solids:	67.0% ± 3.0
VOC: (Volatile Organic Content)	<0.8 lb/gal (100 g/l)

Theoretical Coverage: @1 mil DFT: 1074 ft^2/gal (@ 25 µm DFT: 26.3 m^2/l)

Recommended Film Thickness

Wet: 4.4 – 5.9 mils (110 - 147 microns)

Dry: 3.0 - 4.0 mils (76 - 102 microns)

Recommended Coverage per coat:
268 ft^2/gal at 4.0 mils DFT - 358 ft^2/gal at 3.0 mils DFT
(6.56 m^2/l at 102 microns DFT – 8.77 m^2/l at 76 microns DFT)

Thinning: MC-Thinner, MC-Thinner 100, MC-Thinner XMT

Clean up: MC-Thinner, MC-Thinner 100, MC-Thinner XMT

Drying Times and Temperatures

*At 50% Humidity	50° F/10° C		75° F/24° C		95° F/35° C	
	without PURQuik®	*with PURQuik®*	without PURQuik®	*with PURQuik®*	without PURQuik®	*with PURQuik®*
Tack Free	2 hr	--	1hr	--	30 min	--
Recoat Minimum[1]	8 hrs	***1 hr***	6 hrs	***30 min***	4 hrs	***20 min***
Full Cure	10 days	***7 days***	7 days	***5 days***	5 days	***4 days***

Refer to Wasser's PURQuik® Accelerator Product Data for additional information

*Humidity, temperature and coating thickness will affect recoat and curing times

1. 14 day outer recoat window on clean surfaces.

Product Features

- Single Component Moisture Cure Urethane
- No Mixing Errors.
- No Pot Life
- Protective coating for various substrates
- Easy to apply by brush, roller or spray methods
- VOC compliant at <100 g/L
- Can be applied at 99% humidity (Substrate must be visibly dry)
- Can be applied in below freezing temperatures (no ice or frost)
- No Dew Point Restrictions (Substrate must be visibly dry)
- Compatible with PURQuik® Accelerator for faster recoat and cure times.

Surface Preparation

Ferrous Metal

Apply to clean, dry, Wasser recommended primers. Refer to the primer Product Data for additional information.

Concrete/Concrete Block

The surface must be dry, free of surface contaminants, and in sound condition. Grease, and oil should be removed by ASTM D4258-83 (Reapproved 1999) and release agents should be removed by ASTM D4259 - 88 (Reapproved 1999). Refer to SSPC-SP13/NACE No 6 Mechanical or Chemical Surface Preparation methods for preparing concrete to suitable cleanliness for intended service. Surface preparation methods should impart sufficient surface profile for mechanical adhesion to occur. Ensure surface is thoroughly rinsed and dry prior to coating application. Allow a minimum 7 - 14 days cure time for new concrete prior to preparation and application.

Aluminum/Galvanized/Non-Ferrous Metals

Prepare surfaces using SSPC-SP1 Solvent Cleaning and SSPC-SP12/NACE No. 5 Low Pressure Water Cleaning methods to remove surface contamination. Supplement weathered galvanized surface preparation with SSPC-SP2 and 3 Hand and Power Tool Cleaning to remove excessive corrosion and impart surface profile on bare metal. Supplement new galvanized surface cleaning with mechanical abrasion to impart surface profile and support mechanical adhesion.

Previously Existing Coatings

Prepare surfaces using SSPC-SP12/NACE No. 5 Low Pressure Water Cleaning methods to remove surface contamination. Supplement SSPC-SP 12 LPWC with SSPC-SP1 Solvent Cleaning and SSPC-SP2 and 3 Hand and Power Tool clean areas of corrosion and loose or flaking paint (feather edges of sound, existing paint back to a firm edge). Spot prime clean, bare metal with Wasser recommended primer. Sand glossy surfaces to provide profile. Apply a test sample to a small area to determine coating compatibility.

Good Practices

Spot prime any areas cleaned to bare metal with a Wasser recommended primer.

When using MC-CR 100 as an immersion service intermediate, apply to clean, dry, Wasser recommended primers. Refer to the primer Product Data for additional information.

The surface to be coated must be dry, clean, dull, and free from dirt, grease, oil, salts or any other surface contaminants that interfere with adhesion.

Ensure welds, repair areas, joints, and surface defects exposed by surface preparation are properly cleaned and treated prior to coating application.

When surfaces are cleaned to bare metal, areas of oxidation after surface preparation and prior to coating application, should be prepared to specified standard prior to applying the Wasser recommended spot primer.

Consult the referenced standards, SSPC-PA1 and your Wasser Representative for additional information or recommendations.

Application Information

MC-CR 100 can be applied by brush, roll, airless spray and conventional spray application. Follow proper mixing instructions before applying.

Mixing:

Material temperature must be 5° F above the dew point before opening and agitating.
Power mix thoroughly prior to application.
Do not keep under constant agitation.
Apply a 3-6 oz solvent float over material to prevent moisture intrusion and cover pail.

Brush/Roller:

Brush: Natural Fiber
Roller: Natural or synthetic fiber cover
Nap: ¼" to ⅜"
Core: Phenolic
Reduction: Typically not required. If necessary, reduce with MC-Thinner 100.

Airless Spray:

Pump Ratio: 28-40:1
Pressure: 2100-2800 psi
Hose: ¼" to ⅜"
Tip Size: .013-.019
Filter Size: 60 mesh (250 µm)
Reduction: Typically not required. If necessary, reduce with MC-Thinner or MC-Thinner 100.

Conventional Spray: (DeVilbis MBC, JGA or equivalent)

Fluid Nozzle: E Fluid Tip
Air Cap: 704 or 765
Atomizing Air: 45-75 lbs.
Fluid Pressure: 15-20 lbs.
Hose: ½" ID; 50' Max
Reduction: Typically not required. If necessary, reduce with MC-Thinner or MC-Thinner 100.

Reducer: MC-Thinner, MC-Thinner 100, (if VOC regulations restrict thinning, use MC-Thinner XMT). Reduction is typically not required. If necessary, thin up to 10% with recommended thinner. Thin in accordance with local and federal regulatory standards.

Clean up: MC-Thinner, MC-Thinner 100. If Wasser thinners are not available, use MEK, MIBK, Xylene, a 50:50 blend of Xylene and MEK or MIBK, or acetone for clean up only. Do not add unauthorized solvents to a Wasser coating.

Application Conditions:
Temperature: 20°-100° F (-8°-38° C)
This temperature range should be achieved for ambient, surface and material temperature. Substrate must be visibly dry. MC-Thinner 100 is recommended for spray application in temperatures above 90°F.

Relative Humidity: 6%-99%

Coating Accelerator: PURQuik® Accelerator. See Wasser's PURQuik® Accelerator Product Data for information.

Storage: Store off the ground in a dry, protected area in temperature between 40-100°F (4-38°C). MCU containers must be kept sealed when not in use. Use a solvent float to reseal partial containers.

MC-CR 100

WASSER

Certifications and Qualifications

Revision Date 2/1/2007

VOC Compliant (National Standards – Industrial Maintenance Coating, and Concrete Protective Coating)

Ordering Information

Product Numbers: W171.71 White
W171.75 Buff

Package Size: 1 gallon and 5 gallon pails

Shelf Life: **12 months from date of shipment** when stored unopened at 75°F (24° C)

Shipping Information

Flash Point:	75°F (24°C)
Weight/gallon:	12.5 ± 1.0 lbs. (1.5 ± .12 kg/l)
DOT HAZARD CLASS	3
DOT PACKAGING GROUP	III
DOT LABEL	FLAMMABLE LIQUID
DOT SHIPPING NAME	PAINT
DOT PLACARD	FLAMMABLE LIQUID
UN/NA NUMBER	1263

Safety Precautions

DANGER!

VAPOR AND SPRAY MIST HARMFUL. OVEREXPOSURE MAY CAUSE LUNG DAMAGE. MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTION, EFFECTS MAY BE PERMANENT, MAY AFFECT THE BRAIN OR NERVOUS SYSTEM CAUSING DIZZINESS HEADACHE OR NAUSEA. CAUSES EYE, SKIN, NOSE AND THROAT IRRITATION. FLAMMABLE LIQUID AND VAPOR.

CONTAINS: Petroleum Distillates, Xylene, Ethylbenzene, Modified MDI, Toluene, MAK

NOTICE: Reports have associated repeated and prolonged occupational over-exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal. INDIVIDUALS WITH LUNG OR BREATHING PROBLEMS OR PRIOR REACTION TO ISOCYANATES MUST NOT BE EXPOSED TO VAPOR OR SPRAY MIST. **Use Only With Adequate Ventilation**. Do not breathe dust, vapors or spray mist. Ensure fresh air entry during application and drying. If you experience eye watering, headache or dizziness or if air monitoring demonstrates vapor/mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH approved) during and after application. Follow respirator manufacturer's directions for respirator use. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Keep away from heat, sparks and flame. Vapor may cause flash fire.

KEEP OUT OF REACH OF CHILDREN

FIRST AID: If affected by inhalation of vapor or spray mist, remove to fresh air. If breathing difficulty persists or occurs later, consult a physician and have label information available. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If swallowed, get medical attention immediately. If swallowed, do not induce vomiting. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean or destroy contaminated shoes.
Keep container closed when not in use. If spilled, contain spilled material and remove with inert absorbent. Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.

WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.

Obtain and Read the Material Safety Data Sheet Before Using.

INTENDED FOR PROFESSIONAL USE ONLY.

W171.71

Note: Ingredients and VOC/VOS may vary for products with catalysts, tint bases, and other colors

Wasser Corporation's liability on any claim of any kind, including claims based upon Wasser Corporation's negligence or strict liability, for any loss or damage arising out of, connected with or resulting from the use of the products, shall in no case exceed the purchase price allowable for the products or part thereof that give rise to the claim. In no event shall Wasser Corporation be liable for consequential or incidental damages. Published Product Data Sheets are subject to change without notice. Contact your Wasser Representative for current Product Data Sheets.

MC-Zinc 100

WASSER

Product Description

Wasser's proven, high-performance, single-component, moisture-cure urethane, organic zinc-rich primer is now formulated to meet the strict VOC requirements for industrial maintenance coatings. 83% zinc in the dry film makes MC-Zinc 100 the optimum, zinc-rich primer for maximum resistance to rust and corrosion undercutting on steel structures.

Area of Use

Substrates

Over properly prepared:
Ferrous Metal
Galvanized Metal

Possible Uses

Bridges
Structural Steel
Tank Exteriors
Food Processing Facilities
Material Handling Equipment
Refineries
Pulp and Paper Mills
Marine/Port Facilities
Chemical Processing Facilities
Offshore Platforms
Pipes
Work Boats
Hydropower Facilities
Water and Wastewater Treatment Facilities

Ready Reference Information

Resin Type: Urethanem
Pigment type: 83% Zinc in the dry film
Sheen: Flat
Colors: Standard Grey
Volume Solids: 73.0% ± 3.0
VOC: < 0.8 lb/gal (100g/l)
(Volatile Organic Content)

Theoretical Coverage: At 1 mil DFT: 1171 ft^2/gal
At 25 µm DFT: 28.7 m^2/l
Recommended Film Thickness:
Wet: 4.1-6.8 mils (104-173 microns)
Dry: 3.0-5.0 mils (76-127 microns)
Recommended Coverage Per Coat:
234 ft^2/gal at 5.0 mils DFT - 390 ft^2/gal at 3.0 mils DFT
(5.73 m^2/l at 127 microns DFT - 9.55 m^2/l at 76 microns DFT)

Thinning: MC-Thinner, MC-Thinner 100, MC-Thinner XMT
Clean Up: MC-Thinner, MC-Thinner 100, MC-Thinner XMT

Drying Times and Temperatures

*At 50% Humidity	50°F/10°C		75°F/24°C		95°F/35°C	
	Without *PURQuik®*	With *PURQuik®*	Without *PURQuik®*	With *PURQuik®*	Without *PURQuik®*	With *PURQuik®*
Tack Free	3 hours	--	1.5 hours	--	1 hour	--
Recoat Minimum[1]	6 hours	1 hour	4 hours	30 minutes	3 hours	20 minutes
Full Cure	10 Days	7 days	7 days	5 days	5 days	4 days

*Humidity, temperature and coating thickness will affect recoat and curing times
[1]14 day outer recoat window on clean surfaces.
Refer to Wasser's PURQuik® Accelerator Product Data for additional information

Product Features

- Single component Moisture Cure Urethane
- No mixing errors – no pot life
- Zinc stays in solution – no need for continuous agitation
- Easy to apply by brush, roller or spray methods
- VOC Compliant at less than 100 g/l
- Various service applications
- Impact resistant
- Abrasion resistant
- Can be applied at 99% relative humidity (substrate must be visiably dry)
- Can be applied in below freezing temperatures (no ice or frost)
- No dew point restrictions (substrate must be visbably dry)
- Compatible with PURQuik® Accelerator for faster recoat and cure times(Do not accelerate prime coat on concrete)

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MC-Zinc 100

WASSER

Recommended Systems

Ferrous Metals (Full Removal):

1st Coat: MC-Zinc 100	3.0-5.0 mils DFT
2nd Coat: MC-Ferrox B	3.0-5.0 mils DFT
3rd Coat: MC-Ferrox A	2.0-4.0 mils DFT
Or MC-Luster	
Total System DFT:	8.0-14.0 mils DFT

Ferrous Metals (Overcoat):

1st Coat: MC-Zinc 100 (Spot Prime)	3.0-5.0 mils DFT
2nd Coat: MC-Miomastic	3.0-5.0 mils DFT
3rd Coat: MC-Ferrox A	2.0-4.0 mils DFT
Or MC-Luster	
Total System DFT:	8.0-14.0 mils DFT

Ferrous Metals (Immersion/Severe Service):

1st Coat: MC-Zinc 100	3.0-5.0 mils DFT
2nd Coat: MC-Tar	5.0-7.0 mils DFT
3rd Coat: MC-Tar	5.0-7.0 mils DFT
Total System DFT:	13.0-19.0 mils DFT

Ferrous Metals (Immersion/Light Color Topcoat):

1st Coat: MC-Zinc 100	3.0-5.0 mils DFT
2nd Coat: MC-Ballastcoat	3.0-4.0 mils DFT
3rd Coat: MC-Ballastcoat	3.0-4.0 mils DFT
Total System DFT:	9.0-13.0 mils DFT

Galvanized Metal:

1st Coat: MC-Zinc 100 (Spot Repair)	3.0-5.0 mils DFT
2nd Coat: Miomastic	3.0-5.0 mils DFT
3rd Coat: MC-Ferrox A	2.0-4.0 mils DFT
Or MC-Luster 0	
Total System DFT:	8.0-14.0 mils DFT

Two-Coat System Option

1st Coat: MC-Zinc 100 (Spot Repair)	3.0-5.0 mils DFT
2nd Coat: MC-Ferrox A 0	2.0-4.0 mils DFT
Or MC-Luster 0	
Total System DFT:	5.0-9.0 mils DFT

***Other Systems are available. Contact your Wasser Representative to answer any questions.**

Performance Testing Data

*Contact Wasser Corporation for detailed testing of this product

Compatable Coatings

Primers
MC-Zinc 2.8
MC-Miozinc 100 Miozinc 2.8

Intermediates:

MC-Miomastic 100	MC-Miomastic 2.8
MC-Ferrox B 100	MC-Ferrox B 2.8
MC-CR 100	MC-CR 2.8
MC-Tar 100	MC-Tar 2.8

Topcoats:

MC-Ferrox A 100	MC-Ferrox A 2.8
MC-Luster 100	MC-Luster 2.8
MC-Shieldcoat 100	MC-Shieldcoat 2.8
MC-Tar 100	MC-Tar 2.8
MC-Ballastcoat 2.8	MC-Aluminum 2.8
MC-Aroshield 2.8	MC-Antigraffiti

Topcoats:
EP-61 Potable Water Coating

Coating Accelerator
PURQuik® Accelerator

*Use only with a Wasser recommended intermediate

Surface Preparation

Ferrous Metal

Use SSPC-SP1 solvent cleaning to remove oil and grease or other contaminants prior to employing surface preparation methods.

Blast Clean surfaces for severe service projects to SSPC-SP10/NACE No. 2 Near White Metal finish.

Prepare surfaces for atmospheric service projects to SSPC-SP6/NACE No. 3 Commercial Blast Clean finish. For minimum surface preparation use conscientious power tool cleaning methods in accordance with SSPC-SP3 to remove corrosion and loose or failing paint (feather edges of sound, existing paint back to a firm edge).

Blast cleaning methods should produce an angular surface profile of 1.0 - 2.0 mils (25-50 microns).

Galvanized Metal

Prepare surfaces using SSPC-SP1 Solvent Cleaning and SSPC-SP12/NACE No. 5 Low Pressure Water Cleaning methods to remove surface contamination. Supplement weathered galvanized surface preparation with SSPC-SP2 and 3 Hand and Power Tool cleaning to remove excessive corrosion and impart surface profile on bare metal. Supplement new galvanized surface cleaning with mechanical abrasion to impart surface profile and support mechanical adhesion.

Good Practices

The surface to be coated must be dry, clean, dull, and free from dirt, grease, oil, rust, mill scale, salts or any other surface contaminants that interfere with adhesion.

Ensure welds, repair areas, joints, and surface defects exposed by surface preparation are properly cleaned and treated prior to coating application.

Areas of oxidation after surface preparation and prior to coating application, should be prepared to specified standard

Consult the referenced standards, SSPC-PA1 and your Wasser Representative for additional information or recommendations.

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MC-Zinc 100

WASSER

Application Information

MC-Zinc 100 can be applied by brush, roll, airless spray and conventional spray application. Follow proper mixing instructions before applying.

Mixing:

Material temperature must be 5° F above the dew point before opening and agitating.
Power mix thoroughly prior to application.
Do not keep under constant agitation.
Apply a 2-4 oz solvent float over material to prevent moisture intrusion and cover pail.

Brush/Roller:

Brush:	Natural Fiber
Roller:	Natural or synthetic fiber cover
Nap:	¼" to ⅜"
Core:	Phenolic

Reduction: Typically not required. If necessary, reduce with MC-Thinner 100 or MC-Thinner XMT.

Airless Spray:

Pump Ratio:	28-40:1
Pressure:	2400-2800 psi
Hose:	¼" to ⅜"
Tip Size:	.013 - .017
Filter Size:	60 mesh (250 µm)

Reduction: Typically not required. If necessary, reduce with MC-Thinner, MC-Thinner 100, or MC-Thinner XMT.

Conventional Spray: (DeVilbis MBC, JGA or equivalent)

Fluid Nozzle:	E Fluid Tip
Air Cap:	704 or 765
Atomizing Air:	45-75 lbs.
Fluid Pressure:	15-20 lbs.
Hose:	½" ID; 50' Max

Reduction: Typically not required. If necessary, reduce with MC-Thinner MC-Thinner 100, or MC-Thinner XMT.

Reducer: MC-Thinner, MC-Thinner 100, or MC-Thinner XMT. Reduction is typically not required. If desired, thin up to 8% with MC-Thinner or MC-Thinner 100. MC-Thinner XMT is an exempt solvent specially formulated for Series 200 MCU. Thin in accordance with local and federal regulatory standards.

Clean up: MC-Thinner, MC-Thinner 100. If Wasser thinners are not available, use MEK, MIBK, Xylene, a 50:50 blend of Xylene and MEK or MIBK, or acetone for clean up only. Do not add unauthorized solvents to a Wasser coating.

Application Conditions:

Temperature: 20° - 100°F (-8° - -38°C)
This temperature range should be achieved for ambient, surface and material temperature. Substrate must be visibly dry. MC-Thinner 100 is recommended for spray application in temperatures above 90°F.

Relative Humidity: 6% - 99%

Coating Accelerator: PURQuik® Accelerator. See Wasser's PURQuik® Accelerator Product Data for information.

Storage: Store off the ground in a dry, protected area in temperature between 40 - 100°F (4 - 38°C). MCU containers must be kept sealed when not in use. Use a solvent float to reseal partial containers

Certifications and Qualifications

VOC Compliant (National Standards for Industrial Maintenance Coating, and SCAQMD Rule 1113 IM Coating, Zinc Rich IM Primer effective 1/1/04)

Ordering Information

Product Numbers: **W011.6** **Standard Grey**
W011.0080 **Pink**

Package Size: 1 gallon and 3 gallon pails

Shelf Life: **12 months from date of shipment** when stored unopened at 75°F (24°C)

Shipping Information

Flash Point:	80°F (27°C)
Weight/gallon:	26.7 ± 1.0 lbs. (3.2 ± .12 kg/l)
DOT HAZARD CLASS	3
DOT PACKAGING GROUP	III
DOT LABEL	FLAMMABLE LIQUID
DOT SHIPPING NAME	PAINT
DOT PLACARD	FLAMMABLE LIQUID
UN/NA NUMBER	1263

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MC-Zinc 100

WASSER

Safety Precautions

DANGER!

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CONTAINS: Petroleum Distillates, Methyl-n-Amyl Ketone, Isophorone Diisocyanate, Homopolymer HDI

NOTICE: Reports have associated repeated and prolonged occupational over-exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal. INDIVIDUALS WITH LUNG OR BREATHING PROBLEMS OR PRIOR REACTION TO ISOCYANATES MUST NOT BE EXPOSED TO VAPOR OR SPRAY MIST. **Use Only With Adequate Ventilation**. Do not breathe dust, vapors or spray mist. Ensure fresh air entry during application and drying. If you experience eye watering, headache or dizziness or if air monitoring demonstrates vapor/mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH approved) during and after application. Follow respirator manufacturer's directions for respirator use. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Keep away from heat, sparks and flame. Vapor may cause flash fire.

KEEP OUT OF REACH OF CHILDREN

FIRST AID: If affected by inhalation of vapor or spray mist, remove to fresh air. If breathing difficulty persists or occurs later, consult a physician and have label information available. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If swallowed, get medical attention immediately. If swallowed, do not induce vomiting. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean or destroy contaminated shoes.
Keep container closed when not in use. If spilled, contain spilled material and remove with inert absorbent. Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.

WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.
Obtain and Read the Material Safety Data Sheet Before Using.
INTENDED FOR PROFESSIONAL USE ONLY.

W011.6

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MC-Luster 100

WASSER

Product Description

Wasser's most specified aliphatic, semi-gloss topcoat is VOC compliant to the strictest standards for industrial maintenance coatings. MC-Luster 100 is an ideal MCU urethane topcoat with easy recoat ability, excellent resistance to UV, weathering and abrasion. A proven topcoat solution for projects requiring an esthetic finish with corrosion resistant systems.

Area of Use

Substrates

Over properly prepared:
Ferrous Metal
Galvanized Metal
Aluminum/Non-Ferrous Metal
Metallized
Previously Existing Coatings
Concrete
Concrete Block

Possible Uses

Bridges
Tank Exteriors
Material Handling Equipment
Pulp and Paper Mills
Chemical Processing Facilities
Pipes
Water and Wastewater Treatment Facilities
Structural Steel
Food Processing Facility Floors
Work Boats
Refineries
Marine/Port Facilities
Offshore Platforms
Hydropower Facilities

Ready Reference Information

Resin Type:	Aliphatic Urethane
Pigment type:	Coloring
Sheen:	Semi Gloss
Colors*:	Standard and Various Colors
*See Wasser's Color Chart	
Volume Solids:	74.0% ± 3.0
VOC:	< 0.8 lb/gal (100g/l)
(Volatile Organic Content)	

Theoretical Coverage: at 1 mil DFT: 1203 ft^2/gal
At 25µm DFT: 29.5 m^2/l)

Recommended Film Thickness:
Wet: 2.8-5.6 mils (63-86 microns)
Dry: 2.0-4.0 mils (51-102microns)

Recommended Coverage Per Coat:
300 ft^2/gal at 4.0 mils DFT - 602 ft^2/gal at 2.0 mils DFT
(7.3 m^2/l at 102 microns DFT – 14.7 m^2/l at 51 microns DFT)

Thinning: MC-Thinner, MC-Thinner 100, MC-Thinner XMT
Clean Up: MC-Thinner, MC-Thinner 100, MC-Thinner XMT

Drying Times and Temperatures

*At 50% Humidity	50°F/10°C		75°F/24°C		95°F/35°C	
	Without *PURQuik®*	With *PURQuik®*	Without *PURQuik®*	With *PURQuik®*	Without *PURQuik®*	With *PURQuik®*
Tack Free	3 hours	--	1.5 hours	--	45 minutes	--
Recoat Minimum[1]	10 hours	1 hour	8 hours	30 minutes	6 hours	20 minutes
Full Cure	10 Days	7 days	7 days	5 days	5 days	4 days

*Humidity, temperature and coating thickness will affect recoat and curing times
[1]14 Day outer recoat window on clean surfaces
Refer to Wasser's PURQuik® Accelerator Product Data for additional information

Product Features

- Single component Moisture Cure Urethane
- No mixing errors
- No pot life
- Easy to apply by brush, roller or spray methods
- High performance finish coat for various substrates and service
- VOC Compliant at less than 100 g/l
- UV, impact and abrasion resistant
- Can be applied at 99% relative humidity (substrate must be visiably dry)
- Can be applied in below freezing temperatures (no ice or frost)
- No dew point restrictions above 32°F (substrate must be visiably dry)
- No outer recoat window on clean surfaces
- Compatible with PURQuik® Accelerator for faster recoat and cure times(Do not accelerate prime coat on concrete)

MC-Luster 100

WASSER

Recommended Systems

Ferrous Metals (Full Removal):

1st Coat: MC-Zinc	3.0-5.0 mils DFT
2nd Coat: MC-Miomastic	3.0-5.0 mils DFT
3rd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	8.0-14.0 mils DFT

1st Coat: MC-Miozinc	3.0-5.0 mils DFT
2nd Coat: MC-Miomastic	3.0-5.0 mils DFT
3rd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	8.0-14.0 mils DFT

Ferrous Metals (Overcoat):

1st Coat: MC-Miozinc (Spot Prime)	3.0-5.0 mils DFT
2nd Coat: MC-Miomastic	3.0-5.0 mils DFT
3rd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	8.0-14.0 mils DFT

Aluminum/Non-Ferrous Metals/ Galvanized Metal:

1st Coat: MC-Miomastic	3.0-5.0 mils DFT
2nd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	5.0-9.0 mils DFT

Galvanized Metal:

1st Coat: MC-Miozinc (Spot Repair)	3.0-5.0 mils DFT
2nd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	5.0-9.0 mils DFT

Concrete[1] (Interior/Exterior):

1st Coat: MC-Luster 100	2.0-4.0 mils DFT
2nd Coat: MC-Luster 100	2.0-4.0 mils DFT
Total System DFT:	4.0-8.0 mils DFT

1. Prime coat for concrete may be reduced up to 25% to facilitate coating penetration. Subsequent coating applications may be reduced as necessary up to 8%. Thin in accordance with local and federal regulations.

Note: Use over recommended primers or intermediates for ferrous metal. Not recommended for direct to ferrous metal applications.

***Other Systems are available. Contact your Wasser Representative to answer any questions.**

Performance Testing Data

*Contact Wasser Corporation for detailed testing of this product

Compatable Coatings

Primer:

MC-Zinc 100 and 200	MC-Zinc 2.8
MC-Miozinc 100 and 200	MC-Miozinc 2.8
MC-Ferroclad 100	MC-Ferroclad 2.8
	MC-Prepbond 2.8

Intermediates:

MC-Ferrox B 100 and 200	MC-Ferrox B 2.8
MC-Miomastic 100 and 200	MC-Miomastic 2.8
MC-CR 100 and 200	MC-CR 2.8

Topcoats:

MC-Clear 100	MC-Clear 2.8
	MC-Antigraffiti

Coating Accelerator:
PURQuik® Coating Accelerator

Surface Preparation

Ferrous Metal

Apply to clean, dry, Wasser recommended primers. Refer to the primer Product Data for additional information.

Aluminum/Galvanized/Non-Ferrous Metal

Prepare surfaces using SSPC-SP1 Solvent Cleaning and SSPC-SP12/NACE No. 5 Low Pressure Water Cleaning methods to remove surface contamination. Supplement weathered galvanized surface preparation with SSPC-SP2 and 3 Hand and Power Tool cleaning to remove excessive corrosion and impart surface profile on bare metal. Supplement new galvanized surface cleaning with mechanical abrasion to impart surface profile and support mechanical adhesion.

Concrete/Concrete Block

The surface must be dry, free of surface contaminants, and in sound condition. Grease, and oil should be removed by ASTM D4258-83 (Reapproved 1999) and release agents should be removed by ASTM D4259 - 88 (Reapproved 1999). Refer to SSPC-SP13/NACE No 6 mechanical or chemical surface preparation methods for preparing concrete to suitable cleanliness for intended service. Surface preparation methods should impart sufficient surface profile for mechanical adhesion to occur. Ensure surface is thoroughly rinsed and dry prior to coating application. Allow a minimum 7 - 14 days cure time for new concrete prior to preparation and application.

Previously Existing Coatings

Prepare surfaces using SSPC-SP12/NACE No. 5 Low Pressure Water Cleaning methods to remove surface contamination. Supplement SSPC-SP 12 LPWC with SSPC-SP1 Solvent Cleaning and SSPC-SP2 and 3 Hand and Power Tool clean areas of corrosion and loose or flaking paint (feather edges of sound, existing paint back to a firm edge). Spot prime clean, bare metal with Wasser recommended primer. Sand glossy surfaces to provide profile. Apply a test sample to a small area to determine coating compatibility.

Good Practices

MC-Luster 100 is designed for application to a variety of substrates and tightly adhering, previously existing coatings. Apply a test sample to a small area to determine coating compatibility. Spot prime any areas cleaned to bare metal with a Wasser recommended primer.

MC-Luster 100

WASSER

The surface to be coated must be dry, clean, dull, and free from dirt, grease, oil, rust, mill scale, salts or any other surface contaminants that interfere with adhesion.

Ensure welds, repair areas, joints, and surface defects exposed by surface preparation are properly cleaned and treated prior to coating application.

Consult the referenced standards, SSPC-PA1 and your Wasser Representative for additional information or recommendations.

Application Information

MC-Luster 100 can be applied by brush, roll, airless spray and conventional spray methods. Follow proper mixing instructions before applying.

Mixing:

Material temperature must be 5° F above the dew point before opening and agitating.
Power mix thoroughly prior to application.
Do not keep under constant agitation.
Apply a 2-4 oz solvent float over material to prevent moisture intrusion and cover pail.

Brush/Roller:

Brush:	Natural Fiber
Roller:	Natural or synthetic fiber cover
Nap:	¼" to ⅜"
Core:	Phenolic

Reduction: Typically not required. If necessary, reduce with MC-Thinner 100, or MC-Thinner XMT.

Airless Spray:

Pump Ratio:	28-40:1
Pressure:	2400-2800 psi
Hose:	¼" to ⅜"
Tip Size:	.013-.019
Filter Size:	60 mesh (250 µm)

Reduction: Typically not required. If necessary, reduce with MC-Thinner, MC-Thinner 100, or MC-Thinner XMT.

Conventional Spray: (DeVilbis MBC, JGA or equivalent)

Fluid Nozzle:	E Fluid Tip
Air Cap:	704 or 765
Atomizing Air:	45-75 lbs.
Fluid Pressure:	15-20 lbs.
Hose:	½" ID; 50' Max

Reducer: MC-Thinner, MC-Thinner 100, or MC-Thinner XMT. Reduction is typically not required. If desired, thin up to 8% with MC-Thinner or MC-Thinner 100. MC-Thinner XMT is an exempt solvent specially formulated for Series 100 MCU. Thin in accordance with local and federal regulatory standards.

Clean up: MC-Thinner, MC-Thinner 100. If Wasser thinners are not available, use MEK, MIBK, Xylene, a 50:50 blend of Xylene and MEK or MIBK, or acetone for clean up only. Do not add unauthorized solvents to a Wasser coating.

Application Conditions:

Temperature: 20°-100° F (-8°-38°C)
This temperature range should be achieved for ambient, surface and material temperature. Substrate must be visibly dry. MC-Thinner 100 is recommended for spray application in temperatures above 90°F.

Relative Humidity: 6%-99%

Coating Accelerator: PURQuik® Accelerator. See Wasser's PURQuik® Accelerator Product Data for information.

Storage: Store off the ground in a dry, protected area in temperature between 40-100°F (4-38°C). MCU containers must be kept sealed when not in use. Use a solvent float to reseal partial containers.

Certifications and Qualifications

VOC Compliant (National Standards for Industrial Maintenance and Concrete Protective Coatings and SCAQMD Rule 1113 IM Coating effective 1/1/04)

Ordering Information

Product Numbers: **W211.7 White**
W211.64 Standard Grey
Consult Wasser's Color Chart for additional colors

Package Size: 1 gallon and 5 gallon pails
Shelf Life: **12 months from date of shipment** when stored unopened at 75°F (24°C)

Shipping Information

Flash Point:	76°F (24°C)
Weight/gallon:	12.0 ± 1.0 lbs (1.48 ± 0.12 kg/l)
DOT HAZARD CLASS	3
DOT PACKAGING GROUP	III
DOT LABEL	FLAMMABLE LIQUID
DOT SHIPPING NAME	PAINT
DOT PLACARD	FLAMMABLE LIQUID
UN/NA NUMBER	1263

MC-Luster 100

WASSER

Safety Precautions

DANGER!

VAPOR AND SPRAY MIST HARMFUL. OVEREXPOSURE MAY CAUSE LUNG DAMAGE. MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTION, EFFECTS MAY BE PERMANENT, MAY AFFECT THE BRAIN OR NERVOUS SYSTEM CAUSING DIZZINESS HEADACHE OR NAUSEA. CAUSES EYE, SKIN, NOSE AND THROAT IRRITATION. FLAMMABLE LIQUID AND VAPOR.

CONTAINS: Petroleum Distillates, Xylene, Ethylbenzene, Modified MDI, Modified Polymeric MDI, 4,4'- Diphenylmethane Diisocyanate

NOTICE: Reports have associated repeated and prolonged occupational over-exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal. INDIVIDUALS WITH LUNG OR BREATHING PROBLEMS OR PRIOR REACTION TO ISOCYANATES MUST NOT BE EXPOSED TO VAPOR OR SPRAY MIST. **Use Only With Adequate Ventilation**. Do not breathe dust, vapors or spray mist. Ensure fresh air entry during application and drying. If you experience eye watering, headache or dizziness or if air monitoring demonstrates vapor/mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH approved) during and after application. Follow respirator manufacturer's directions for respirator use. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Keep away from heat, sparks and flame. Vapor may cause flash fire.

KEEP OUT OF REACH OF CHILDREN

FIRST AID: If affected by inhalation of vapor or spray mist, remove to fresh air. If breathing difficulty persists or occurs later, consult a physician and have label information available. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If swallowed, get medical attention immediately. If swallowed, do not induce vomiting. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean or destroy contaminated shoes. Keep container closed when not in use. If spilled, contain spilled material and remove with inert absorbent. Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.

WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.

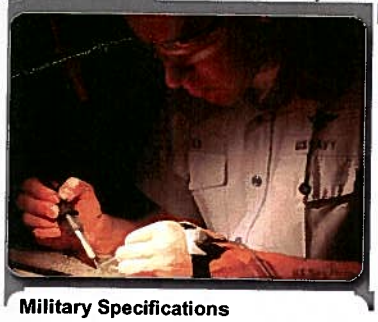
Obtain and Read the Material Safety Data Sheet Before Using.

INTENDED FOR PROFESSIONAL USE ONLY.

W211.7

Note: Ingredients and VOC/VOS may vary for products with catalysts, tint bases, and other colors

Wasser Corporation's liability on any claim of any kind, including claims based upon Wasser Corporation's' negligence or strict liability, for any loss or damage arising out of, connected with or resulting from the use of the products, shall in no case exceed the purchase price allowable for the products or part thereof that give rise to the claim. In no event shall Wasser Corporation be liable for consequential or incidental damages. Published Product Data Sheets are subject to change without notice. Contact your Wasser Representative for current Product Data Sheets.



Military Specifications

Search by Document #
When searching for MIL-PRF-23236 search on "23236", complete document # must be entered for results.

[redacted]

OR

Search by Document Title
Enter a keyword that will be in the title or content of the desired Military Specification

[redacted] Search

Show All MilSpecs

MESSAGE RE: QPLs will now be QDSs (Qualification Dataset)

The DoD is in the process of transitioning product qualification information from Qualified Products Lists (QPL) to the new Qualified Products Database (QPD) which is accessible via ASSIST. We recently uploaded QPL 23236-77, which advised users that products qualified to MIL-PRF-23236 are now listed in the QPD. After 1 Aug 07, all new and revised product qualification information will be issued via the QPD; no new or revised QPLs will be issued. For additional information on the QPL-QPD transition, see Defense Standardization Program Policy Memo 07-3

Step-By-Step Instructions on How to Obtain a QDS

1. Go to the ASSIST Database
2. Enter your Login information. If you do not currently have access, you must register through ASSIST. You will receive a user name and password within 5 business days.
3. Once you are on the ASSIST Home page
   a. GO TO THE LEFT NAVIGATION MENU AND CLICK ON QPD
   b. This will bring you to the QPD screen, hit the SEARCH button
   c. Enter the document # you wish to search (example) 23236 and hit enter
   d. The link to the Military specification will appear, click on it and it will display all the QDSs that are related to MIL-PRF-23236.

If you experience any issues with the above method or need further guidance,

Search Results

MIL-PRF-24647D (SH) WITH INTERIM AMENDMENT 1.pdf
- mil-prf-24647 - paint system, anticorrosive and antifouling, ship hull
  - MIL-PRF-24647D.pdf
  - QPL-24647-10 NOTICE 1.pdf
  - MIL-PRF-24647D (SH) WITH INTERIM AMENDMENT 1.pdf
  - F718s for Ameron Products on QPL-24647
  - F718s for Hempel Products on QPL-24647
  - F718s for International Products on QPL-24647
  - F718s for Sherwin-Williams Products on QPL-24647

MIL-PRF-24647D.pdf
- mil-prf-24647 - paint system, anticorrosive and antifouling, ship hull
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  - F718s for International Products on QPL-24647
  - F718s for Sherwin-Williams Products on QPL-24647

Ameron International
Amercoat 235

QPL- 24647 -10

Type II Class 1 Grade A Applications 2 and 3

This NAVSEA APPROVED ASTM F-718 data sheet is the only data sheet approved for use when utilizing this coating for U.S. Navy preservation projects. Questions regarding modifications or updates of this ASTM F-718 shall be directed toward NSWCCD-SSES Code 614, (215) 897-1319, email: forrest.pilgrim@navy.mil

NAVSEA Approval Date 11/16/2006

ASTM F 718

SHIPBUILDERS AND MARINE

PAINTS AND COATINGS
PRODUCT / PROCEDURE DATA SHEET NO. Amercoat 235

I. GENERIC TYPE AND DESCRIPTION:
Specification Number (If Applicable): MIL-PRF-24647; MIL-PRF-23236

II. MANUFACTURERS DATA:

(a) MANUFACTURER: Ameron Coatings

(b) PRODUCT DESIGNATION: Amercoat 235

(c) COLOR(S): Oxide Red, Black, Haze Gray, Buff, Off-white

(d) USES: Underwater hull and above water shipboard surfaces, ballast tanks

(e) TECHNICAL SERVICE REPRESENTATIVE:
Please refer to your local technical service representative

(f) NOT RECOMMENDED FOR:

III. PROPERTIES:

(a) %VOLUME SOLIDS (ASTM D2697 - 7 day cure): 64.6 - 71.4%

(b) FLASH POINT (SETA): 100°F

(c) WEIGHT PER GALLON (ASTM D-1475): 10.4 - 11.7 lbs.

(d) SHELF LIFE: 1 year from shipment date

(e) VISCOSITY (ASTM D-562): Thixotropic

(f) PACKAGING: 1 and 5 gallon units

(g) NUMBER OF COMPONENTS: 2

(h) GLOSS (ASTM D-523): N/A

(i) VOC: 340 g/L max

(j) STORAGE REQUIREMENTS: TEMP. MIN. 40 °F MAX. 100 °F

(k) VOLATILE ORGANIC COMPOUND (EPA TEST METHOD 24): 2.4 lbs/gal (292 g/L)

(l) WEIGHT OF DRY FILM (pounds per square foot at one mil): 0.0079

Product should be stored at temperatures of 40°F-100°F. The product may be subject to temperatures from 0°F to 140°F during transport for up to 30 days without adverse effects. If the product is exposed to more extreme temperatures or for a longer duration, please contact Ameron technical service for an evaluation. Product temperatures must be 50°F-90°F during mixing and application unless otherwise stated in section VI.a.

SPECIAL SAFETY PRECAUTIONS:

Inhalation:	Move to fresh air. Keep warm and quiet.
Skin Contact:	Flush with large amounts of water, remove contaminated clothing.
Eye Contact:	Immediately flush with clean water for at least 15 minutes. Call physician.
Ingestion:	Call physician immediately. SEE MSDS FOR FURTHER DETAILS.

IV. SURFACE PREPARATION MINIMUM REQUIREMENTS (USE SPECIFIC STANDARD NUMBERS):

Refer to NAVSEA Standard Item 009-32

(over)

V. MIXING PROCEDURE:

(a) MIXING RATIO BY WEIGHT – 5.87:1
BY VOLUME – 4:1

(b) INDUCTION TIME – 15 minutes

(c) RECOMMENDED SOLVENT - THINNING — T-10 Solvent
CLEAN UP — T-10 Solvent or Amercoat 12 Cleaner

(d) THINNING REQUIREMENTS (RATIO) – 10% or less, see special instructions (V,f)

(e) POT LIFE – 4.5 Hr(s) @ 77 °F(25 °C)
_____ Hr(s) @ _____ °F(_____ °C)
_____ Hr(s) @ _____ °F(_____ °C)

(f) SPECIAL INSTRUCTIONS – May be thinned up to 10% by volume. Consult local VOC or air quality regulations. Maximum thinning results in a VOC of 343 g/L (2.86 lbs/gal).

VI. APPLICATION:

(a) ENVIRONMENTAL LIMITATIONS –

*TEMP. MIN. 32°F MAX. 120°F

*% RELATIVE HUMIDITY Refer to NAVSEA Standard Item 009-32

* CAUTION SHOULE BE TAKEN THAT SURFACE TEMP. IS AT LEAST 5°F ABOVE DEW POINT.

(b) FILM THICKNESS Refer to NAVSEA Standard Item 009-32

(c) DRY TIMES (ASTM D-1650) – RECOAT MIN. 2 Hr(s) @ 90 °F (32 °C) @ 50 % R.H.
MIN. 4 Hr(s) @ 70 °F (21 °C) @ 50 % R.H.
MIN. 8 Hr(s) @ 50 °F (10 °C) @ 50 % R.H.
MIN. 16 Hr(s) @ 32 °F (0 °C) @ 50 % R.H.
MIN. 28 Hr(s) @ 20 °F (-7 °C) @ 50 % R.H.

MAX. 1 Month** @ 70 °F (21 °C)

TO HANDLE MIN. 5 Hr(s) @ 90 °F (32 °C) @ 50 % R.H.
MIN. 10 Hr(s) @ 70 °F (21 °C) @ 50 % R.H.
MIN. 22 Hr(s) @ 50 °F (10 °C) @ 50 % R.H.
MIN. 45 Hr(s) @ 32 °F (0 °C) @ 50 % R.H.
MIN. 62 Hr(s) @ 20 °F (-7 °C) @ 50 % R.H.

FOR IMMERSION

Refer to NAVSEA-approved ASTM F718 for antifouling coating

(d) EQUIPMENT REQUIREMENTS -
Airless - Heavy duty airless pump, 0.021" - 0.031" tip.
Air - Fluid tip 0.070" - 0.086", air cap #64

(e) SPECIAL INSTRUCTIONS – Drying times are guidelines. Excessive film thickness, poor ventilation, and excessive humidity can cause deviation. See the Material Safety Data Sheet and product label for complete safety and precaution requirements.

** Antifouling should be applied before Amercoat 235 has cured hard.

Ameron International
ABC #3

QPL- 24647 -10

Type II Class 1 Grade A Application 2 and 3

QPL- 24647 -10

Type II Class 3 Grade A Application 2

NAVSEA APPROVED

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ASTM F 718

SHIPBUILDERS AND MARINE

PAINTS AND COATINGS
PRODUCT / PROCEDURE DATA SHEET NO. ABC #3 Ablative Antifouling Coating

I. GENERIC TYPE AND DESCRIPTION: Antifouling coating
Specification Number (If Applicable): MIL-PRF-24647

II. MANUFACTURERS DATA:

(a) MANUFACTURER: Ameron International
Performance Coatings & Finishes
13010 Morris Road, Suite 400
Alpharetta, GA 30004

(b) PRODUCT DESIGNATION: ABC #3

(c) COLOR(S): Red, black

(d) USES: Underwater hull anti-fouling coating

(e) TECHNICAL SERVICE REPRESENTATIVE
Paul Whitehead
800/ 926-3766

(f) NOT RECOMMENDED FOR:

III. PROPERTIES:

(a) %VOLUME SOLIDS (ASTM D2697): 52% +/- 3%

(b) FLASH POINT (SETA): 83°F

(c) WEIGHT PER GALLON (FTMS141a 4184.1): 16.2-17.5 lbs

(d) SHELF LIFE: 1 year from shipment

(e) VISCOSITY (FTMS141a 4281): 70-110 ku

(f) PACKAGING: 5-gal pails

(g) NUMBER OF COMPONENTS: 1

(h) GLOSS (ASTM D523): 25%, max

(i) VOC: 3.3 lbs/gal

(j) STORAGE REQUIREMENTS: TEMP. MIN. 40 °F MAX. 100 °F

Product should be stored at temperatures of 40°F-100°F. The product may be subject to temperatures from 0°F to 140°F during transport for up to 30 days without adverse effects. If the product is exposed to more extreme temperatures or for a longer duration, please contact Ameron technical service for an evaluation. Product temperatures must be 50°F-90°F during mixing and application unless otherwise stated in section VI.a.

SPECIAL SAFETY PRECAUTIONS:

See MSDS for both components.

IV. SURFACE PREPARATION MINIMUM REQUIREMENTS (USE SPECIFIC STANDARD NUMBERS):

Refer to NAVSEA Standard Item 009-32

(over)

V. MIXING PROCEDURE:

(a) MIXING RATIO BY WEIGHT – N/A
BY VOLUME – N/A

(b) INDUCTION TIME – N/A

(c) RECOMMENDED SOLVENT - THINNING – Not recommended
CONFINED AREAS –
NON-CONFINED AREAS –
CLEAN UP – T-10

(d) THINNING REQUIREMENTS (RATIO) – None

(e) POT LIFE – N/A _____ Hr(s) @ _____°F(_____°C)
_____ Hr(s) @ _____°F(_____°C)
_____ Hr(s) @ _____°F(_____°C)

(f) SPECIAL INSTRUCTIONS – Power mix to ensure pigment is uniformly suspended

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VI. APPLICATION:

(a) ENVIRONMENTAL LIMITATIONS –

Surface *TEMP. MIN. 32°F _MAX. 120°F
Ambient air MIN. 32°F _MAX. 120°F

*% RELATIVE HUMIDITY Refer to NAVSEA Standard Item 009-32

(b) FILM THICKNESS Refer to NAVSEA Standard Item 009-32

(c) DRY TIMES (ASTM D1650) – RECOAT MIN. 2 Hr(s) @ 90 °F (32 °C) @ _____% R.H.
MIN. 4 Hr(s) @ 70 °F (21 °C) @ _____% R.H.
MIN. 8 Hr(s) @ 50 °F (10 °C) @ _____% R.H.

MAX._____ Hr(s) @ _____°F (_____°C)

TO HANDLE MIN. N/A Hr(s) @ _____°F (_____°C) @ _____% R.H.
MIN. _____ Hr(s) @ _____°F (_____°C) @ _____% R.H.
MIN. _____ Hr(s) @ _____°F (_____°C) @ _____% R.H.

FOR IMMERSION MIN. 4 Hr(s) @ 90 °F (32 °C)
MIN. 5 Hr(s) @ 70 °F (21 °C)
MIN. 10 Hr(s) @ 50 °F (10 °C)

MAX. N/A Hr(s) @ _____°F (°C)

(d) EQUIPMENT REQUIREMENTS (INCLUDE PREFERRED, SUITABLE AND NOT SUITABLE REQUIREMENTS)

(e) SPECIAL INSTRUCTIONS – Must be applied to primer that is tack-free but soft to finger pressure

*CAUTION SHOULD BE TAKEN THAT SURFACE TEMPERATURE IS AT LEAST 5°F ABOVE DEW POINT.
**SEE SPECIFICATIONS

PPG Amercoat

Amercoat® 235

235 Series

Multi-purpose epoxy coating

Product Data/ Application Instructions

- Exceptional corrosion protection in salt and fresh water immersion and corrosive chemical environments
- Surface tolerant, lowers the cost of surface preparation
- Excellent adhesion to tight rust
- Good adhesion to damp surfaces
- Low temperature cure, cures down to 0°F (-18°C)
- Fast dry-to-recoat
- Self-priming

Low solvent content meets VOC requirements, reduces the chances for film pinholing and solvent entrapment at the substrate-coating interface, often a major cause of coating failure with conventional epoxies and lower solids systems.

Typical Uses

Tank Linings and Pipe Coatings

- Ballast tanks
- Bilges, wet voids and drainage pipes

Ships, Offshore and Marine Structures

- Above and below-water hull areas
- Decks and superstructures
- Multi-purpose repair coating

Fabrication and New Construction

- Speeds up production, even at low temperatures
- A single multi-purpose, surface-tolerant coating

Qualifications

- MIL-PRF-23236C, Type V, Class 7, Class 5 (for topside and underwater hull) Type 1 and IV Class 2
- Canada Health and Welfare, dry food, fish holds (off white and buff only)
- USDA approval for incidental food contact (limited colors)
- MIL-P-24647 and Chapter 631, Table 631-8-10, keel to rail and exterior topside

Chemical Resistance Guide

ASTM D 1308, 24 hour contact at 77°F	Excellent, no effect on film integrity
50% Sodium hydroxide	10% Hydrochloric acid
28% Ammonia	20% Tannic acid
5% Trisodium phosphate	Crude oil
25% Citric acid	5% Sodium chloride
25% Lactic acid	10% Ammonium hydroxide
10% Sulfuric acid	Sewage

Physical Data

Finish	Semigloss	
Color	Haze Gray, Med. Gray, Black, Off-White, Buff, Oxide Red, Med. Green	
Components	2	
Curing mechanism	Solvent release and chemical reaction between components	
Volume solids (ASTM D2697 modified)	68% ± 3%	
Dry film thickness (per coat)	4-8 mils (100-200 microns)	
Coats	1 or 2	
Theoretical coverage	ft^2/gal	m^2/L
1 mil (25 microns)	1091	26.8
5 mils (125 microns)	218	5.4
VOC (EPA 24)	lb/gal	g/L
mixed	2.4	292
Temperature resistance	dry	
	°F	°C
continuous	250	121
Flash point (SETA)	°F	°C
Amercoat 235		
resin	98	37
cure	90	32
T-10	80	27
Amercoat 65	81	27
Amercoat 101	145	63
Amercoat 12	2	-17

Application Data

Applied over	Steel, concrete, aluminum, galvanizing
Surface preparation	
Steel	SSPC-SP2, 3, 7, 10 or 12, WJ-2L, SC-1, or 12 (WJ-2L, SC-1)
Concrete	ASTM D4259 or 4260
Aluminum	Alodine®, Alumiprep® or light abrasive blast
Galvanizing	Galvaprep® or light abrasive blast
Method	Airless or conventional spray. Brush or roller may require additional coats.
Mixing ratio (by volume)	4 part resin to 1 part cure
Thinner	T-10, 65 or 101
Equipment cleaner	Thinner or Amercoat 12
Pot life	70°F 4.5 hours

Drying time	°F/°C				
	90/32	70/21	50/10	32/0	20/-7
dry through(hours)	5	10	22	45	62

Typical Properties

Physical

Property	Method	Result
Abrasion Resistance	ASTM D 4060, CS-17 1000 gram load, 1000 cycles	120 mg loss
Adhesion	ASTM D 4541	1000 psi
Exterior Exposure	Exposed in Florida facing integrity 45° South for	No effect on film
		3 years or adhesion. Less than ½ inch undercutting at scribe. Less than 2% rust at edges.
Humidity Resistant	ASTM D 2247,1000 hours.	No effect on film integrity or adhesion. Less than ½ inch undercutting at scribe. Less than 2% rust at edges.
Immersion Resistance	ASTM D 1308 Water, 24 months at 77°F	No effect
Impact Resistance	ASTM D 2794, 10 ga. steel	60 inch-pounds
Moisture Permeability	ASTM E 96	0.7 perms
Pencil Hardness	ASTM D 3363	3H
Salt Fog Resistance	ASTM B 117, 1000 hours	No effect on film integrity or adhesion. Less than ½ inch undercutting at scribe. Less than 2% rust at edges.

Systems

1st coat	2nd Coat	3rd coat
Amercoat 235	None	None
Amercoat 235	Amercoat 229 Series	None
Amercoat 235*	Amercoat 235*	None
Amercoat 235	Amercoat 235	Antifouling Systems ABC® 3, ABC 4, ABC® Release
Dimetcote® 9 Series or 302 Series	Amercoat 235	None
Dimetcote 9 Series or 302 Series	Amercoat 235	Amercoat 450 Series

**Immersion service.*

Tank Coating System – Two coats of Amercoat 235 at 4 to 8 mils (100 to 200 microns) per coat, plus two stripe coats over sharp edges, cutouts and welds. Use contrasting colors for each coat and stripe coat.

Recoat/Topcoat time (@ 5 mils DFT)

			°F/°C		
minimum (hours)	90/32	70/21	50/10	32/0	20/-7
Amercoat 235	2	4	8	16	28
Amercoat 229 Series	3	4	7	12	40

			°F/°C			
maximum (days)	120/49	90/32	70/21	50/10	32/0	20/-7
Amercoat 235	30	30	30	30	30	30
Amercoat 229 Series	1	4	5	5	7	7
Amercoat 450 Series	1	4	5	5	7	7

Cure to immersion 7 days

Drying times are dependent on air and surface temperatures as well as film thickness, ventilation and relative humidity. Maximum recoating time is highly dependent upon actual surface temperatures - not simply ambient air temperatures. Surface temperatures should be monitored, especially with sun-exposed or otherwise heated surfaces. Higher surface tempertures shorten the maximum recoat window.

Roughen surface if maximum recoat / topcoat time is exceeded.

Surface Preparation

Coating performance is, in general, proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. When this is impossible or impractical, coating can be applied over mechanically cleaned surfaces.

Amercoat 235 may be used over most types of tightly adhering coatings prepared with Amercoat 88. A test patch is recommended for use over existing coatings.

The surface preparation recommended for Amercoat 235 is to include removal of water, salt, dirt, oil, loose rust and **all rust scale**. For maximum performance, treat all surfaces with Amercoat 88 Cleaner, followed by high pressure wash. The minimum standard for non-immersion service is Steel Structures Painting Council Standard SSPC-SP2 or Swedish Standard DSt2; for immersion service, the minimum standard is SSPC-SP3 or Swedish Standard DSt3, in each case a coat of Amerlock Sealer followed by a full coat of Amercoat 235 can also be used.

Steel – All direct to metal coatings provide the maximum performance over near white blasted surfaces. There are, however, situations and cost limitations, where grit blasting to near white metal is not possible. Amercoat coatings were designed to provide excellent protection over less than ideal surface preparation. SSPC-SP12 WJ-2L is also acceptable over a previous blasted surface. The maximum soluble salt content for saltwater immersion should be 3 µg/cm². For freshwater immersion, the limit is 2 µg/cm². For atmospheric exposure, it can be as high as 10 µg/cm².

Aluminum – Remove oil, grease or soap film with neutral detergent or emulsion cleaner, treat with Alodine® 1200, Alumiprep® or equivalent or blast lightly with fine abrasive.

Galvanizing – Remove oil or soap film with detergent or emulsion cleaner, then use zinc treatment such as Galvaprep® or equivalent or blast lightly with fine abrasive.

Concrete – Acid etching (ASTM D4260) or abrasive blast (ASTM D4259) new concrete cured a minimum of 14 days.

Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment such as Graco Bulldog 30:1 or larger, with a 0.021- to 0.025-inch fluid tip, ⅜" ID hose with 50 ft. maximum length.

Conventional spray – Industrial equipment, such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators for air and fluid pressure are recommended.

Power mixer – Jiffy Mixer powered by an air or explosion-proof electric motor.

Brush or roller – Additional coats may be required to attain proper thickness.

Environmental conditions

Air and Surface Temperature
20° to 122°F (-7° to 50°C)

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation. At freezing temperatures, surface must be free of ice.

To obtain the maximum performance, adhere to all application instructions, precautions, conditions and limitations. For conditions outside the requirements or limitations described, contact your PPG representative.

Application Procedure

1. Flush all equipment with thinner or Amercoat® 12 before use.
2. Stir base using an explosion-proof power mixer to disperse pigments.
3. Add cure to resin. Mix thoroughly until uniformly blended to a workable consistency.

Induction time (minutes)	70°F/21°C
	15

4. Do not mix more material than can be used within the expected pot life, 4½ hours at 70°F.
5. For optimum application, material should be from 50° to 90°F (10° to 32°C).
6. Use only PPG recommended thinners at 1 pint/gal.

   Below 50°F additional thinning may be needed and multiple coats required to achieve specified thickness.
7. To minimize orange peel appearance, adjust conventional spray equipment to obtain adequate atomization at lowest air pressure.
8. Apply a wet coat in even, parallel passes with 50 percent overlap to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
9. When applying directly over inorganic zincs or zinc-rich primers, a mist coat/full coat technique may be required to minimize bubbling. This will depend on the age of the Dimetcote®, surface roughness and conditions during curing.
10. Ventilate confined areas with clean air between coats and while curing the final coat. Prevent moisture condensation on the surface between coats.
11. Repair damaged areas by brush or spray.
12. Clean equipment with thinner or Amercoat 12 immediately after use.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

Shipping Data

Packaging unit	1 gal	5 gal
Shipping weight (approx)	lbs	kg
1-gal unit		
resin	12.7	5.8
cure	2.0	0.9
5-gal unit		
resin	51.2	23.2
cure	8.8	4.0

Shelf life when stored indoors at 40° to 100°F (4° to 38°C)
resin and cure — 1 year from shipment date.

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Safety Precautions

Read each component's material safety data sheet before use. Mixed material has hazards of both components. Safety precautions must be strictly followed during storage, handling, and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep solvent vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. PPG makes no recommendation about the types of safety measures that may need to be adopted because these depend on application and space, of which PPG is unaware and over which it has no control.

If you do not fully understand the warnings and instructions or if you cannot strictly comply with them, do not use the product.

This product is for industrial use only. Not for residential use.

PPG Protective & Marine Coatings
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Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 7

Stennis Space Center
Electrical Construction Standards



National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

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Revision A
December 2006

John C. Stennis Space Center
Facility Electrical Standard

Original signed by

Randall Canady
NASA SSC Center Operations
Project Management Division

Robert Heitzman
NASA SSC Center Operations
Operations and Maintenance Branch

Issued by

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Document History Log

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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

			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.
A	12/29/06	James W. Hughes x 8-2304	Revalidated. Updated references and amended text to reflect proper references. Appendix A additions, deletions, and changes per text edits. Corrected typographical errors throughout document. Added Note in section 5.13 (k). Changed titles for signatures per NASA SSC organization changes.

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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 SSTD 8070-0005-CONFIG.

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.)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.147	The Control of Hazardous Energy (Lockout/Tagout)
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 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
ANSI/IEEE 386	Separable Insulated Connectors
ASTM C1089-06	Standard Specification for Spun Cast Pre-stressed Concrete Poles
IEEE 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE 112	Standard Test Procedure for Polyphase Induction Motors and Generators
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 Standard MG1-12.53	Motors and Generators

(a), (b)

NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
NPR 8820.2	Facility Project Implementation Guide
NPR 8715.3	NASA General Safety Program Requirements
NSTS 07636	Lighting Protection Criteria Document
SPR 1400.1	Document Preparation, Numbering and Management
SPR 8715.1	Safety and Health Procedural Requirements
SSC STD 50-002	Lighting Standard Design for Energy Conservation
SSC STD 99-006	Preparation of Construction Specifications
SSC STD 99-020	Standard for the 13.8 kV Distribution System
SSTD-8070-0001-CONFIG	Facilities Engineering Documentation Standard
SSTD-8070-0002-CONFIG	SSC Facilities Drafting Manual
SSTD 8070-0005-CONFIG	Preparation, Review, Approval and Release of SSC Standards (SSTD's)
UL 1561	Safety Dry-Type General Purpose and Power Transformers
SCWI-8500-0026-ENV	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 SSTD 8070-0005-CONFIG.

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 SCWI-8500-0026-ENV, NASA/SSC Environmental Resources Document (ERD) and SPR 8715.1.

4.3 CODES, STANDARDS, AND REGULATIONS

The design and installation of electrical systems shall comply with the current edition of NPR 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.**

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 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.

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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 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 affect 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.

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 Sulfur Hexaflouride (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.

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
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.

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."

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 de-rating, raceway fill de-rating, 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 Heat Resistant Thermoplastic (THHN)/ Moisture and Heat Resistant Thermoplastic (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 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 Site-wide Operational and Repair Documentation (SORD) drawings.

5.8 RACEWAYS

5.8.1 General

a. Perform raceway fill calculations with consideration to all de-rating required by the National Electric Code (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.

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 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 drawing(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 drawing(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).

j. Cable tray installation shall be detailed and shown on the drawing(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.

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 (non-sinusoidal) 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.

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.

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 normally open (N.O.) and two normally closed (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.

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.

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.

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. Multiple circuits shall be numbered using all space designations that the breaker occupies. (**Note:** All circuit directory information and panel information is to be collected, updated, and disseminated through a central Electrical Breaker Panel database maintained by Central Engineering Files (CEF).)

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 un-insulated equipment ground bus (EG).

c. SPP shall be UL listed.

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.

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.

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.

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.

RELEASED - Printed documents may be obsolete; validate prior to use.

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 light emitting diode (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 through a status indicator, independent from maintenance personnel. Continuous status of that test shall be held in the unit until the next test cycle.

RELEASED - Printed documents may be obsolete; validate prior to use.

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, hand-off automatic (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 de-energize 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.

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.

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.

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.

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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 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.

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, which 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 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
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 Interface
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
GFCI	Ground-Fault Circuit-Interrupter
HOA	Hand-off Automatic

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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
NASA	National Aeronautics and Space Administration
N.C.	Normally Closed
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
N.O.	Normally Open
NPR	NASA Procedural Requirements
NSTS	National Space Transportation System
O&M	Operating and Maintenance
OSHA	Occupational Safety and Health Act
PCB	Polychlorinated Biphenyl
PM	Project Manager
PVC	Polyvinyl Chloride

S&MA	Safety and Mission Assurance
SF	Sulfur Hexaflouride
SI	International System Metric units of measure
SKM	name of manufacturer of "Power Tools for Windows"
SORD	Site-wide Operational and Repair Documentation
SpecsIntact	Specifications kept Intact
SPP	Special Power Panelboard
SPR	Stennis Procedural Requirements
SSC	Stennis Space Center
SSLP	Stennis System Level Procedure
SSTD	SSC Standard
STD	Standard
THHN	Heat Resistant Thermoplastic
THWN	Moisture and Heat Resistant Thermoplastic
UL	Underwriter's Laboratory
UPS	Uninterrupted Power Supply
U.S.C.	United States Code
V	volt
VAC	Volts Alternating Current
Y	connection type (3-phase)

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 8

Stennis Space Center Documentation Standards

Facilities Engineering Documentation Standard

Only provided in electronic format

SSTD-8070-0001-CONFIG
Revision B
May 2007

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

John C. Stennis Space Center
Facilities Engineering Documentation Standard

Original signed by

Randall Canady
NASA SSC Center Operations
Project Management Division

Issued by

Issued CEF 06/05/2007
Central Engineering Files

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Document History Log

Change/ Revision	Date	Originator/ Phone	Description
Basic	09/11/01	Jim Wolfenbarger ext. 8-2304	Initial release - supercedes SSC STD 66-500 Rev. M, with the following changes: New document number and format per SPG 1400.1; Change signature title per NASA SSC reorganization; Change Facilities Engineering Division (FED) to Engineering Services Division (ESD); Change CADD/Documentation Supervisor to Drafting/Standards Manager; Changes as needed for new document numbers; Figure 2 revise block 3 for "EO Sheet" SORD; 1.0 new title and complete rewrite; 2.0 add ref to SWIs 8810-0003 and 8810-0012; 3.0 Responsibilities add new, Acronyms and Abbreviations move to Appendix A; 4.0 combine step c with steps b and e, change d to c; 7.2.1 add ref to SSTD 8070-0002-CONFIG; 7.3.2.1 add ref to "structural" type drawings; 7.3.2.4 add ref to "type J" drawings; 7.3.3 delete ref to types K, F, T, N and W; 7.4 delete "issuance"; 8.3.1 delete text redundant to section 1.2; 8.3.2, 8.3.6.3, and 10.1.1 delete microfilming; 8.3.3.1 revise text and move to 8.3.5.1 and 8.3.5.2; 8.3.3.4 revise for clarity; 8.3.4.1 add new Figure 3 for EMI approval by FRB; 8.3.4.3 move EO-related text to 8.3.5.1, delete "crossing out" of change data; 8.3.5.1 step a complete revision; 8.3.5.1-f change "drawing" to "EMI"; 8.3.5.2-a change EO incorporation requirement; 8.3.9.1 add COC requirement for EMI procurements; 8.3.9.2 add dig permit (form SSC-618) and CCC 5-part card (form SSC-633); 10.1.3 change database access authority.
Admin Change Basic-1	10/03/01		In all places, change "5-part card (form SSC-558C)" to "CCC 5-part card (form SSC-633)".

A	01/12/07	James W. Hughes ext. 8-2304	Revalidated. Updated references and amended text to reflect proper references. Corrected typographical errors throughout document. Changed titles for signatures per NASA SSC organization changes.
B	05/25/07	James W. Hughes ext. 8-2304	Deleted reference to SWI-8810-0003-FACENG per document cancellation; this document was not superseded. Deleted references to SSLP-1440-0001 per document cancellation; replaced with superseding document SPR 1440.1. Appendix A: deleted SSLP, deleted SOP, added FOSC, and added CFO. Replaced references to NASA Engineering Services Division, Design Branch with Project Management Division throughout document per NASA organization restructure.

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1.0 INTRODUCTION

1.1 PURPOSE

This Standard (STD) establishes the responsibilities, requirements and practices for facility engineering documentation related to the configuration control of Site-wide Operation and Repair Document (SORD) systems at the John C. Stennis Space Center (SSC).

1.2 APPLICABILITY

This SSC STD (SSTD) complements SSTD-8070-0002-CONFIG (*SSC Facilities Drafting Manual*) and applies to all SSC NASA organizations, resident agencies and contractors involved with the design, implementation, operation and documentation of configuration changes to SSC SORD systems and their related baseline control documentation.

1.3 AUTHORITY

This SSTD shall be controlled and maintained in accordance with SSTD-8070-0005-CONFIG and section 3.0 herein. Final authority for the approval and interpretation of this SSTD resides with the SSC Center Operations Directorate Project Management Division.

2.0 REFERENCES

Referenced documents shall be the latest edition unless otherwise specified.

NPR 8820.2	Facility Project Implementation Guide
NPR 8800.15	Real Estate Management Program Implementation Manual
SOI-8040-0001-FACENG	SSC Organization Instruction Construction Configuration Management
SOI-8080-0015	Configuration Control of Propulsion Test Systems
SPR 1150.1	John C. Stennis Space Center Establishment of Charters - Boards/Councils/Committees
SPR 1400.1	Document Preparation, Numbering, and Management
SPR 1440.1	Records Management Program Requirements
SSC STD 97-011	Requirements for the Numbering of SSC Locations, Mechanical Components, and Pressurized Vessels and Tanks

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SSC STD 99-006	Preparation of Construction Specifications
SSTD-8070-0002-CONFIG	SSC Facilities Drafting Manual
SSTD-8070-0005-CONFIG	Preparation, Review, Approval and Release of SSC Standards (SSTD's)
SSTD-8070-0006-CONFIG	Component Servicing Documentation
SSTD-8070-0009-CONFIG	Preparation of Form SSC-625, Certificate of Completion (COC)
SSTD-8070-0010-CONFIG	Maintenance of the System Operation and Maintenance Responsibility Database (SOMRD)
SWI-8810-0012-FACENG	Central Engineering Files (CEF) Standard Operating Procedure
SSC Building Plans Manual	Space Utilization/Facility Floor Plans

3.0 RESPONSIBILITIES

a. NASA SSC Project Management Division is responsible for oversight and acceptance of projects and related documentation affecting SSC facilities configuration baseline in accordance with Section 4.0 herein.

b. SSC Facilities Review Board (FRB) and Configuration Control Boards (CCBs) are responsible for identifying and monitoring changes to SSC facilities baseline configuration in accordance with Section 8.1 herein.

c. Facility Operating Services Contractor (FOSC) Engineering Services Department (ESD) Design Engineering and Drafting are responsible for maintaining drawings identified in this SSTD in accordance with SSTD-8070-0002-CONFIG.

d. Central Engineering Files (CEF) is responsible for release, repository and archiving of the documentation identified in this SSTD in accordance with SPR 1440.1, SWI-8810-0012-FACENG and this SSTD.

e. SSC NASA and contractor organizations are responsible for review and approval of changes to or cancellation of this SSTD in accordance with SSTD-8070-0005-CONFIG.

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f. FOSC ESD shall support the Project Management Division with development, review, approval and release of changes to or cancellation of this SSTD in accordance with SSTD-8070-0005-CONFIG.

g. Users of this SSTD shall comply with its requirements, ensure use of the correct version of this SSTD and the documents it references, and inform the appropriate organization of needed changes in accordance with SSTD-8070-0005-CONFIG.

4.0 FACILITY DESIGN AND INSTALLATION DOCUMENTATION

a. All design and construction projects that affect SSC facilities configuration baseline shall have a NASA Project Manager and NASA Technical Monitor assigned by the NASA SSC Center Operations Directorate, Project Management Division. Unless specified otherwise on the work plan, the Project Manager shall ensure that applicable documentation is completed in accordance with this standard and the referenced documents herein.

Note: for most projects, one person serves as both the Project Manager and the Technical Monitor; but, a given project may have separate individuals assigned to these roles, in which case, the Technical Monitor supports the Project Manager.

b. Facility drawings define the configuration and provide control documentation for roads, canals, utilities, buildings, and other primary facilities at SSC. Affected systems are identified by the Site-wide Operational and Repair Document (SORD) Family Tree system defined in section 7.2. All configuration control documentation, including design drawings for original SSC facilities (which are included in the SORD system), original shop drawings prepared by vendors, and facilities configuration change documentation, such as Engineering Modification Instructions (EMI), Engineering Orders (EO) and Field Change Requests (FCR), shall be filed in Central Engineering Files (CEF). See Section 8.1.

c. Persons requesting information from CEF are required to fill out a CEF "Request for Service" form. (Refer to SWI-8810-0012-FACENG.) CEF is responsible to inform the requestor of any other documents that may affect the correctness of the information being requested and to note on the work request if the customer refuses the additional information. (See flow chart, Figure 1.)

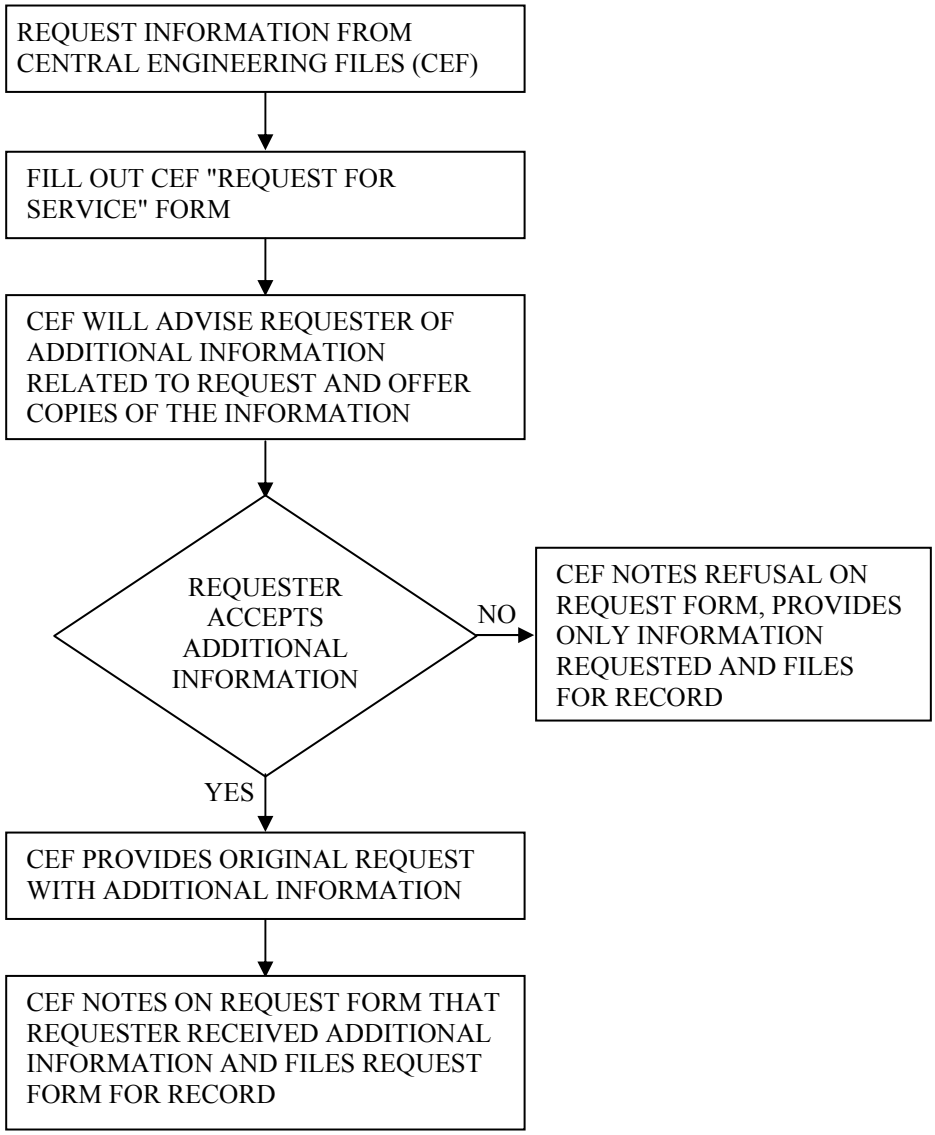


Figure 1. Process Flow Chart for Customer Request of Information from CEF.

5.0 TECHNICAL SYSTEMS DESIGN AND INSTALLATION DOCUMENTATION

This documentation consists of drawings, technical specifications, and operations & maintenance (O&M) manuals that make up the design packages for test complex technical systems. The following type technical systems are installed and operating: Facility/Special Test Equipment (STE) Test Instrumentation Systems, Facility/STE Test Item Control Systems, Test Support Systems (High Pressure Gas/Water and Cryogenics), Control and Instrumentation, Communications Systems, and Test Warning Systems. These technical system drawings are identified by MT-1X-XXXX-XXX drawing number and have been incorporated in the SORD system as 48000-XXXX. Advanced Electrical Schematics are required documentation generated to facilitate tracing circuits.

6.0 FLOOR PLAN DOCUMENTATION

Floor plans issued by Real Property are plans of buildings or structures showing exterior walls, fences, interior partitions, windows, doors, other wall and/or floor openings, and room identification numbers. Floor plans are not part of the SORD system. (See SSC Building Plans Manual.)

6.1 NUMBERING SYSTEM

Each drawing will be identified by the building or structure number of the building shown.

6.2 UPDATE REQUIREMENT

Revisions to the SSC Building Plans Manual showing the latest configuration of the facility are printed annually. Floor plan drawings will be updated as projects are completed. Drawings may be updated numerous times during the year. The date serves as a revision and will be changed every time the drawing is updated.

7.0 SITE-WIDE OPERATIONAL AND REPAIR DOCUMENTATION (SORD)

SORD is the NASA approved baseline documentation system for SSC. SORD documentation is defined as the drawings and specifications that shall be updated and maintained to reflect current configuration of SSC facilities and systems. Configuration management requirements are defined by NASA and shall be maintained by all contractors at SSC.

SORD drawings shall be formatted according to SSTD-8070-0002-CONFIG. Drawings prepared by an outside contractor require submittal to the NASA Project Management Division. The approval block for NASA Engineering and NASA Safety does not reflect technical approval nor relieve the contractors of their liabilities; it only reflects acceptance. CEF shall ensure that new and revised SORD drawings are in compliance with this standard and shall enter the "Issued CEF" stamp (with date) on the drawing to indicate official issuance.

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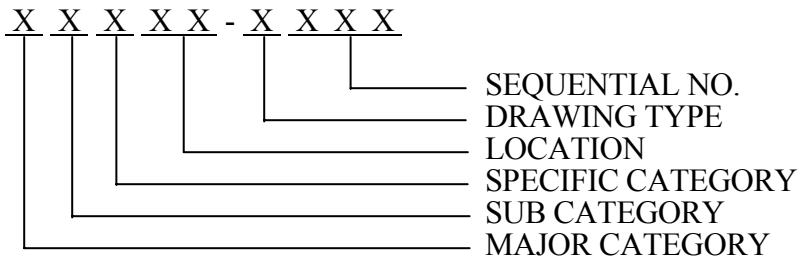
7.1 FAMILY TREE

The SORD system is based on a family tree that defines the drawing numbering system at SSC. Each drawing and specification is assigned a specific location by CEF on the tree for ease of traceability.

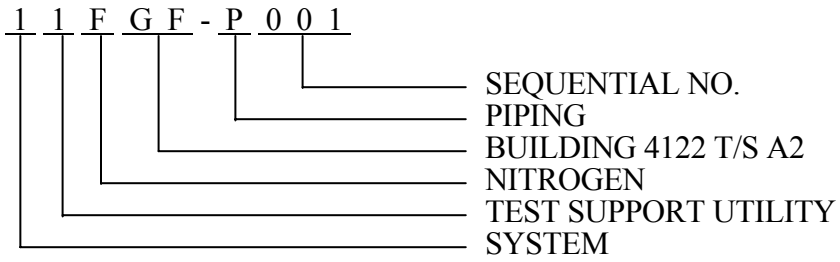
The complete family tree drawing, in matrix format, is on the Computer Aided Design and Drafting (CADD) system at U:DRAWING/SSC MASTER GRIDS/MASTER SITE GRIDS/00000-X001,2 , & 3. This drawing has been designed to provide for expansion of the SORD system in developing the site and shall be revised to reflect any new facilities or systems.

7.2 NUMBERING SYSTEM

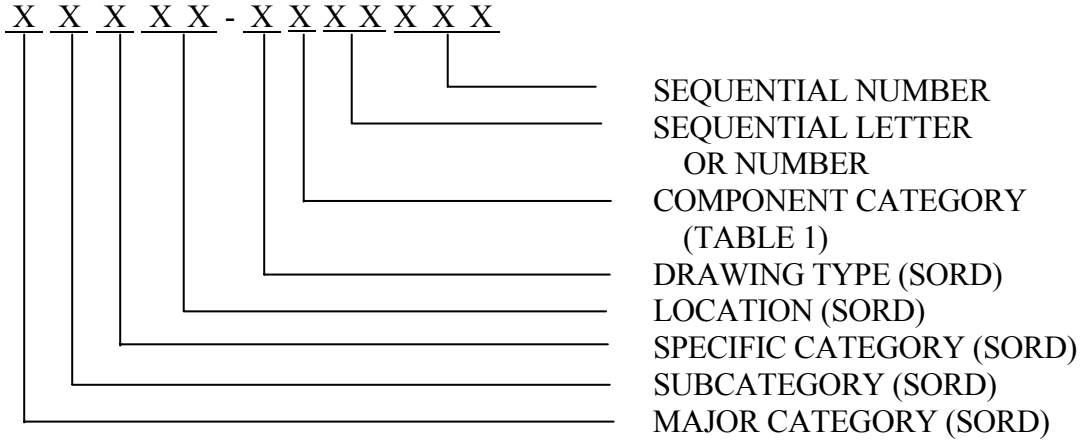
7.2.1 SORD. Each drawing is given a nine-digit alpha-numeric number derived from the SORD Family Tree matrix by CEF. All baseline documents shall be identified by a SORD number. Each document number shall be recorded on the specific category drawing list. The drawing number is derived as follows: (Ref SSTD-8070-0002-CONFIG, Fig. 12)



Example:



7.2.2 SCD. Specification Control Drawing (SCD) numbers are assigned by CEF in accordance with SSC STD 97-011 and SSTD-8070-0006-CONFIG. The SCD number is a 12-digit alpha-numeric number, the first six of which are derived from the SORD Family Tree drawing and are invariable; e.g., 54B00-G. The seventh digit is a letter which designates the component category, as shown in the example below. The remaining five digits are reserved for sequentially assigned letters and numbers. The SCD number is derived as follows:



Example:

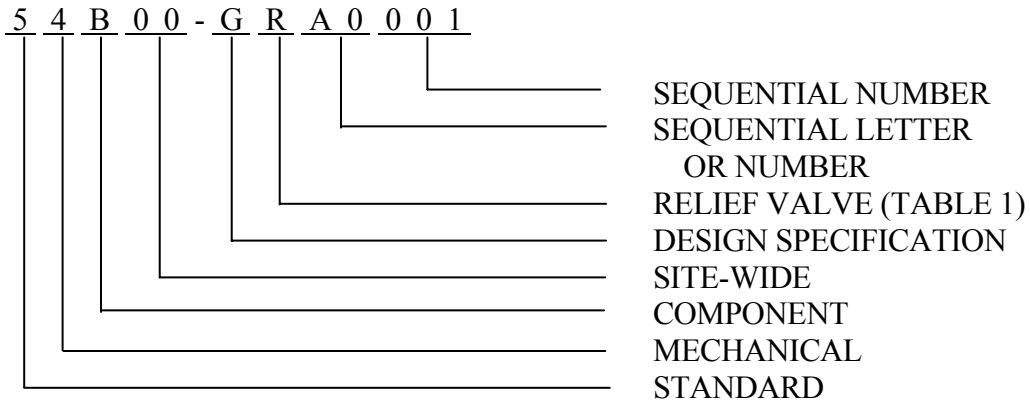
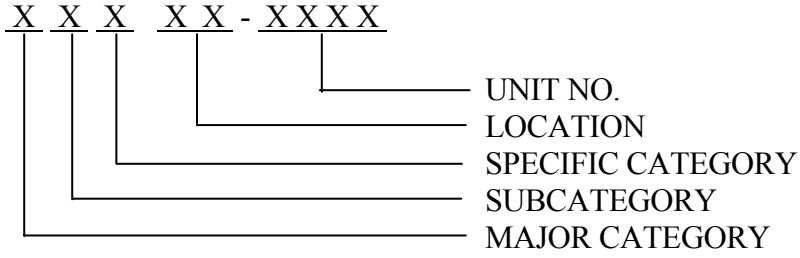


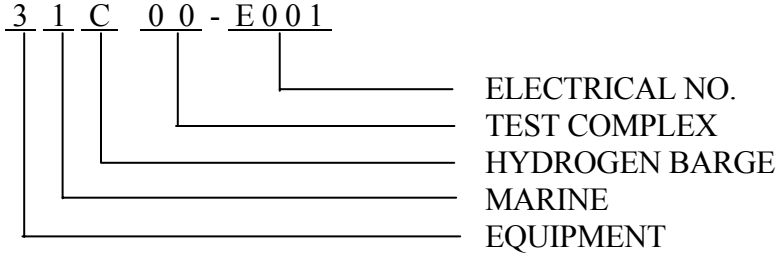
TABLE 1. SCD COMPONENT CATEGORY LIST

Code	Component	Code	Component
A	Control Package	N	Level Control Valve
B	Control Valve	P	Pressure Control Valve
C	Check Valve	Q	(Not Assigned)
D	Dome Loader	R	Relief Valve
E	Expansion Joint	S	Strainer
F	Flex Hose	T	(Not Assigned)
G	Gas Filter	U	(Not Assigned)
H	GH-Flow Meter	V	Hand Valve
J	GJ-Gage (Pressure Indicator)	W	Accumulator (Vessel)
K	Pump	X	Actuator
L	Liquid Filter	Y	Diaphragm
M	Motor Valve	Z	Solenoid Valve

7.2.3 Equipment Numbering. All equipment requiring configuration management (baseline equipment) shall be given a nine-digit alpha-numeric number derived from the SORD Family Tree matrix by CEF. The subcategory and the specific category shall correlate with the type of equipment within each building. The unit number shall correlate with the type of equipment (e.g., mechanical, electrical). The equipment number is derived as follows:



Example:



7.3 DOCUMENTATION DEFINITIONS AND REQUIREMENTS

7.3.1 General

7.3.1.1 Building/Area - Index List (Drawing (DWG) Nos. 20000-D002 - D012).
A cross-index list providing reference from the three-digit "building number" (section 6.1) to the SORD drawing list number shall include all trade discipline drawings required for each building.

7.3.1.2 Site Plan - Building Numbers. A map of the entire SSC fee area drawn to the scale of 1=10,000 or metric (SI) scale, as appropriate for the accuracy required, shall be annotated to indicate which scale system is utilized. Each building and structure shall be shown with its NASA approved building number.

7.3.1.3 Specification Control Drawings (SCDs). SCDs are prepared to define the specifications of certain components used at SSC. Refer to SSTD-8070-0006-CONFIG and SSTD-8070-0002-CONFIG for more information.

7.3.2 Facility

7.3.2.1 Architectural - Structural. The normal building trade drawings include floor plans, elevations, sections, details, and equipment layout. Architectural drawings are designated type A. Structural drawings are designated type S.

Note: Changes in modular systems and partition arrangements will not be kept up-to-date on floor plans (Section 6.0) unless required for clarity.

7.3.2.2 Civil. The normal trade drawings include area plans, landscaping, road plans, profiles, and contours. These drawings are designated type C.

7.3.2.3 Electrical. The facility electrical drawings include lighting plans, facility equipment installation, one-line power distribution schematics, wiring diagrams, panel schedules, and conduit schedules. For new facilities or major renovations to existing facilities, the configuration will be updated to include 110-volt systems, and maintained. All EMIs, EOs, FCRs, etc. involving electrical load modifications at/or above the 110-volt level require FRB and/or CCB coordination prior to implementation. These drawings are designated type E.

7.3.2.4 Communication. These drawings include intercom, voice data, utility control systems distribution, video tele-conferencing, oral warning, installation drawings, personal computer and local area network, wiring diagrams, and schematics. These drawings are designated type J.

7.3.2.5 Mechanical. Normal trade drawings include heating, ventilating, air conditioning plans/elevations; plumbing plans/profiles; and other utility plans/elevations. These drawings are designated type M.

7.3.2.6 Piping Schematic. Piping schematics are piping diagrams drawn in single line flow schematic forms, depicting the relative location of all components used in the piping system. Only one specific "system" shall be shown on a piping schematic. Purge lines shall be shown on the prime system only, to the first valve restricting inter-mix of systems. These drawings are type P.

a. Location Grid Key Block - All test stand piping schematics shall have a location grid key block per legend sheet DWG 54000-P001. Key components shall be assigned references to help locate them on the stands.

b. Component-System Locator Numbers - Each component shall be identified on the drawings and shall have a system component locator number provided by CEF.

7.3.2.7 Site Distribution Plan

a. Index Sheet/Reference Sheets - The first sheet of the Site Distribution Plan is the index sheet. It shall show the entire system throughout the site and shall be divided into thirty-six (36) "Reference Sheets" each of which shall interface with its adjacent sheets and shall be prepared to a scale per SSTD-8070-0002-CONFIG.

b. Underground - Site Work Drawings - These provide details of construction and shall be cross-referenced.

c. Fluid Utility Systems - Drawings and the piping schematics for each area shall be cross-referenced. Piping locations shall be referenced by the piping schematics for each applicable area. Locations of all service access ways through which a system passes (e.g., valve pits and manholes) shall be shown.

7.3.3 Technical Systems

7.3.3.1 Advanced Schematics - Electrical. An Electrical Advanced Schematic shows, by means of graphic symbols, the point-by-point electrical connections and functions of a specific circuit. This schematic facilitates tracing the circuit and its functions without regard to the actual physical size or shape of the component or parts within an assembly. The advanced schematics shall be developed so they can be read functionally, top-to-bottom, or be consistent with the existing advanced schematics within the same system. These advanced schematics shall be primarily mono-system with interfacing systems shown for reference only. These drawings are designated type K.

7.3.3.2 Advanced Schematics - Instrumentation. Instrumentation Advanced Schematics shall be generated according to the same rules of paragraph 7.3.3.1. Exception: More than one system may be shown on the advanced schematics if there is an interrelationship between these systems, unless depicting them separately would more clearly define each system. These drawings are designated type K.

7.3.3.3 Block Diagrams. A block diagram is a single-line drawing with block outlines to designate units of functional groups for system definition. It shall be Sheet One in the package of system Advanced Schematics. The block diagram shall be primarily mono-system (with interfacing systems shown for reference only) and shall be developed from top to bottom. These drawings are designated type K or W.

7.3.3.4 Installation and Equipment Drawings. The installation and equipment drawings are required to document the technical systems equipment installations. The physical location of equipment shall be presented on layout drawings which may encompass an area as small as a panel or relay rack, or as large as a building or complex. Where appropriate, the panel subassemblies may be combined with the internal wiring diagram. Where large areas are involved, the equipment layout shall be the installation type, and the location of the equipment shall clearly be identified with regard to adjacent buildings or portions thereof. These drawings are designated type F.

7.3.3.5 Interconnection Wiring Diagrams. A form of connection or wiring diagram, these drawings show only external connections between unit assemblies, system components, or equipment. The internal connections of these assemblies, components, or equipment shall not be included on this drawing unless absolutely required for clarity. These drawings are designated type F.

7.3.3.6 Wiring Diagrams. These drawings delineate the point-to-point wiring within an item of equipment, component, assembly, enclosure, or panel. The general physical arrangement of terminations shall be correct, but there is no requirement for a detailed physical routing of wiring. (This diagram may be shown on the assembly layout.) These drawings are designated type W.

7.3.3.7 Wiring Termination Sheet. These drawings depict wiring interconnections between bays, racks, and terminal boxes. They shall show each terminal (used or spare) and the wire termination with a reference to the cable schedule or installation drawing for routing. Destination and drawings to terminate the other ends of the wires and cables shall be referenced. Where wiring termination sheets exist, wire schedules are not required. These drawings are type T.

7.4 NEW DRAWING GENERATION

New drawings are generated when: (a) the site modification requires facility additions; or (b) there is new equipment for which there are no existing baseline or vendor drawings; or (c) the new work cannot be put on the existing baseline drawing. These drawings shall be C, D, or F size only.

New baseline (SORD) drawings shall be prepared consistent with the requirements of this Standard and SSTD-8070-0002-CONFIG. Standard (multi-use) items shall be drawn in SORD format. The first drawing shall show assembly and/or installation information and will contain sufficient detail to maintain design criteria. This drawing will become a new baseline drawing upon receipt of a Certificate of Completion (COC) confirming that the job is complete (section 8.3.9).

The other drawings required to depict fabrication details shall be the appropriate size and shall have an Engineering Modification Instruction (EMI) document number. Do not use "B" size drawings for EMI documents (section 8.3.4).

7.5 MAKE-FROM DRAWINGS

This baseline drawing is generated to document a change to a component or piece of equipment purchased from a vendor as a complete unit and not shown in detail on any SORD drawings. These units are identified by a vendor drawing or identified in O&M manual by procurement specification number. This vendor data shall be retained in CEF. These drawings are type B.

8.0 CONFIGURATION CONTROL OF SORD BASELINE

8.1 CONFIGURATION BASELINE

The configuration baseline is identified by SORD documentation and systems requiring configuration control as identified by the CCB responsible for the respective system (hereafter referred to as baseline). Changes to baseline shall be documented as specified in Section 8.3.3. All changes to baseline shall be monitored by a CCB. Refer to SOI-8040-0001-FACENG and SPR 1150.1.

8.2 ADMINISTRATIVE CHANGES

Administrative changes are permitted on all drawings for correcting typographical and other minor errors, including errors of omission. However, administrative changes shall be treated like any other change or drawing revision, and filed in CEF. An administrative change shall be indicated by adding a letter "A" immediately following the revision number. All subsequent administrative changes should be made in like manner (i.e., a drawing may have more than one "A" following the revision number). When the drawing is revised, the revision number shall be changed and the "A" designation(s) shall be deleted. Administrative changes may be approved only by signature of the Drafting/Standards Manager or designee.

8.3 DRAWING REVISIONS/CANCELLATION

8.3.1 General Provisions. The following requirements provide for configuration accountability through the design, implementation, and documentation phases of configuration changes.

8.3.2 Drawing Cancellations. To cancel a drawing, revise it to the next revision number, write in the revision space that the drawing is cancelled and remove it from the active file.

8.3.3 Drawing Revisions. Revision to any SORD baseline drawing shall be made only when authorized. Each revision to a SORD baseline drawing shall be reviewed and signed by an authorized NASA Engineer before issuance by CEF, which will stamp the drawing with non-black ink "Issued CEF" (with date). SORD drawing revisions require that an EMI package be generated to ensure proper review and to document the change. (Refer to sections 8.3.4, EMI and 8.3.5, EO.) FCRs (8.3.6) and change requests (8.3.7) shall be used for revisions made during construction.

8.3.3.1 EO Incorporation. Refer to sections 8.3.5.1 and 8.3.5.2.

8.3.3.2 As Designed. When an uncompleted project is in construction, the Drafting/Standards Manager is authorized to incorporate the project as designed to allow documentation to be updated. When the project is complete and redline changes are provided with the COC, the redlines will be incorporated into the SORD drawings.

8.3.3.3 SORD Review and Acceptance. All "approved SORD" baseline drawing revisions must be reviewed and accepted by the NASA Center Operations assigned Project Manager.

8.3.3.4 Main Plan Views and Sections. The main plan views, elevations, sections, and views shall be reviewed and revised as required. The detailed sections and views shall be modified to reflect design changes that affect the overall dimension of the building.

8.3.3.5 Underground Utility Drawings. Underground utility drawings will be updated using information gained from digging permits. The information will be consolidated and assigned an EO number against baseline documentation.

8.3.4 Engineering Modification Instruction (EMI). The EMI (form SSC-151) is a multiform change control document that provides total control of changes to the SORD baseline drawings. EMIs are generated when the request is made to change the baseline configuration with proper documentation. Changes can be requested by Facility Change Request (FCR) form SSC-61, Engineering Change Request (ECR) form SSC-650, Stennis Work Request (SWR) form SSC-704, Project Data Sheet (PDS) form SSC-702, or by letter to the Facilities Review Board (FRB). EMIs are prepared as specified in SSTD-8070-0002-CONFIG, *Facilities Drafting Manual*.

8.3.4.1 Review and Approval of EMI. The appropriate NASA divisions shall receive copies of EMI packages, which must be approved by NASA SSC Project Management before any construction may be implemented. Configuration change and EMI approval process flow are illustrated in Figures 2 and 3.

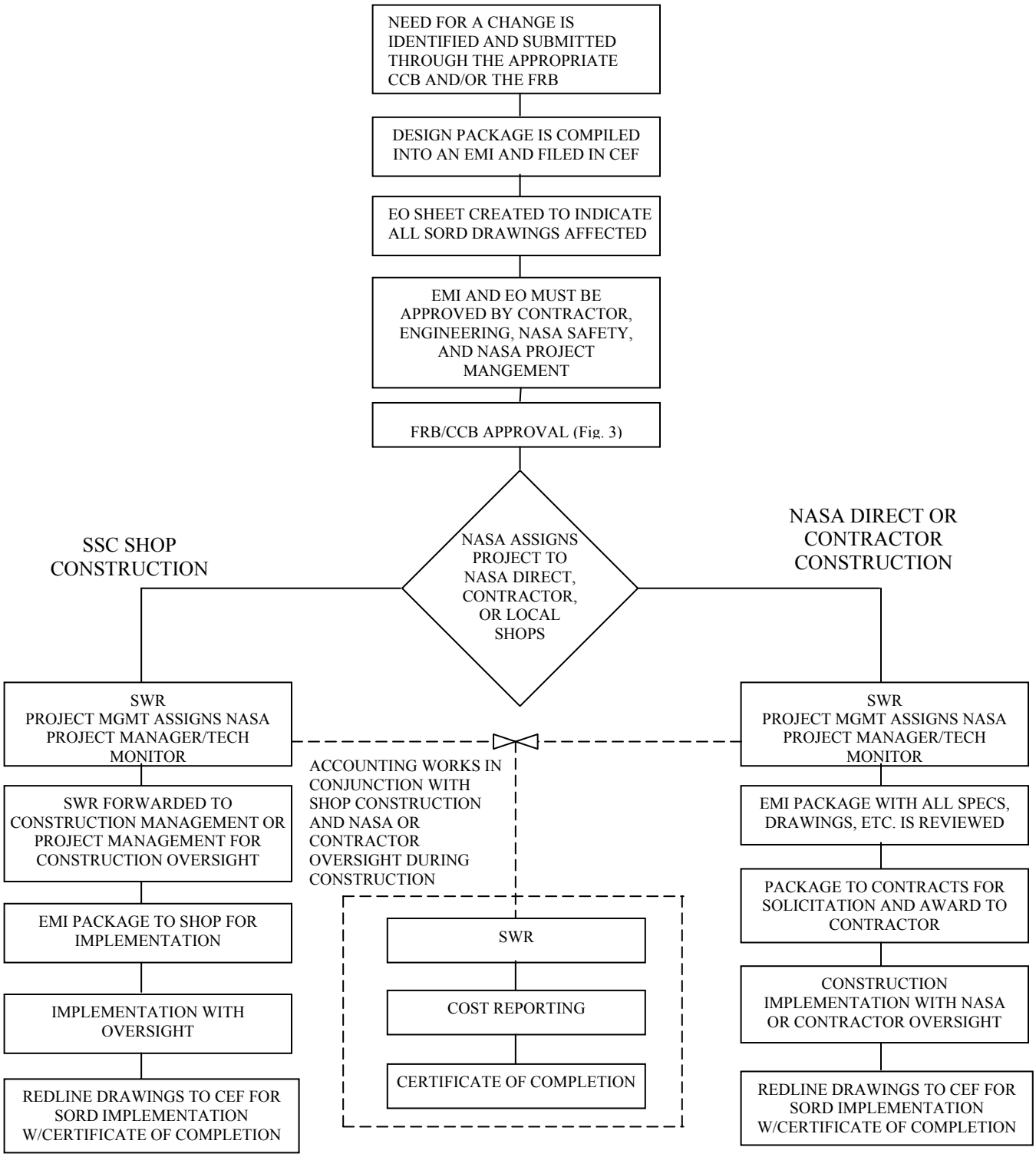


Figure 2. Process Flow Chart for Configuration Changes

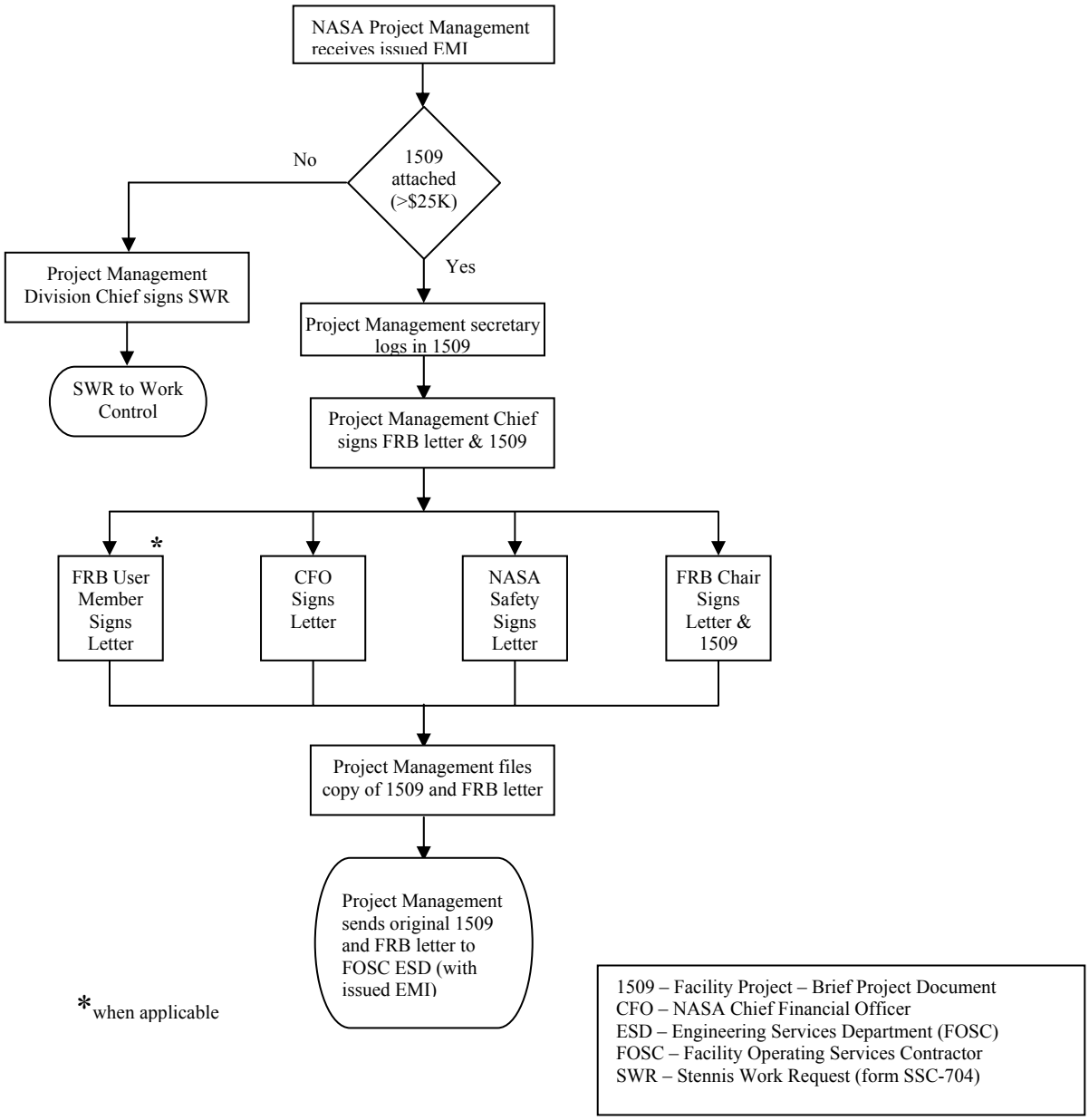


Figure 3. Process Flow Chart for Facility Review Board (FRB) Approval of Engineering Modification Instruction (EMI)

8.3.4.2 Implementing EMI Changes. To implement an approved change, an EMI shall be used by engineering for all changes to facility baseline. Implementation documents shall include sufficient delineation notes to provide only one interpretation of the desired end product. The documents shall include EMI index; EOs, installation, assembly, detail assembly, or detail design, and parts list, as required. Items having multiple use such as special supports, clamps, brackets, tools, or electrical splice build-ups may be prepared on separate assembly or detail drawings. These multiple-use drawings shall be permanent baseline standard drawings. Sketches may be utilized as required, depending on the degree of construction clarification needed. The specification portion of the implementation documents should complement the drawings and be sufficient yet brief enough to convey the engineer's intent to the builder. Implementation of construction projects in excess of $25,000 shall be approved by the FRB via NASA Form 1509, Facility Project Document. Implementation of construction projects less than $25,000 shall be approved by FRB approval letter or SWR signed by FRB representative. Refer to Figure 3.

8.3.4.3 Revisions to EMIs. The EMI documents or Parts List may be revised upon obtaining the originals from CEF. The revised document shall be approved per Section 8.3.4.1 and subsequently distributed by CEF. The original package index and EO (ref. section 8.3.5) shall be revised if any subsequent sheet in the package is revised. A brief description of the revision should be entered in the revision column. The revision designation shall be entered adjacent to the changed data, new data shall be entered and the area/zone of the affected drawing shall be noted in the revision column. General provisions for EMI revisions are as follows. For details, refer to SSTD-8070-0002-CONFIG.

a. Other than standard-size drawing sheets may be used, such as brief sketches. Use of an EMI Index Sheet is required. If other than standard formats are used, they shall be identified and approved in the same manner as the EMI document (ref. 8.3.4.1).

b. When the EMI requires specifications, the specifications shall conform to the maximum extent possible with SpecsIntact format (ref. SSC STD 99-006).

c. When the EMI requires a parts list, include reference information on the package index under interim documentation.

d. When the EMI requires addition of new equipment or a new facility for which there is no existing baseline drawing, new drawings shall be generated; EOs (ref. 8.3.5) shall be generated as required to document the interfaces and shall reference the new drawings; and the "Comments" block of the EMI cover sheet shall include a note that documents are to be changed to SORD upon receipt of the COC (ref. 8.3.9).

e. The original EMI package index shall always be revised for subsequent releases.

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8.3.5 Engineering Order (EO). An EO is a written document (form SSC-151D) that denotes SORD drawing changes. It calls out the drawing number and the EMI that documents the change. EOs provide a method to document approved drawing changes prior to receipt of baseline original drawings or prior to actually making changes on the drawing. EOs are used to change SORD drawings only and shall not be used to change EMIs (ref. section 8.3.4).

8.3.5.1 EO Procedures. The following rules shall be adhered to without deviation when preparing, issuing, incorporating, or canceling EOs.

a. EOs will be assigned when the project goes to construction.

b. EO numbers are assigned by CEF only against current, baseline drawings, and only when authorized by an approved EMI (ref. section 8.3.4).

Note: CEF shall not be contacted for EO assignments until just prior to the EMI package going to construction.

c. EO numbers shall be assigned and released only once. Further revision or correction requires that a subsequent EO be issued which cancels and supersedes the issued EO. (The cancelled EO and the new EO shall be marked as specified in 8.3.5.1-k.)

d. The EO number shall consist of the root number of the baseline drawing followed by the letters "EO" followed by the EO sequence number.

e. EOs must be released in numerical sequence.

f. The EO title shall be identical with the title of the EMI.

g. EOs may have multiple sheets appropriately numbered.

h. For EOs which document a change already accomplished or which does not affect existing hardware, the words "Documentary Release" shall appear across the top of the EO and distribution shall be limited to information only.

i. When generating an EO against a Tech System Wiring Tab List, the pre-printed tab list EO form shall be used in lieu of EO Form SSC-151D.

j. An EO that is inadvertently written may be referenced on the EMI Index Sheet without revising the drawing.

k. An EO may be canceled in either of the following ways.

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1. Generate a new EO on a new form. Across the top of the form, add the note "EO __ CANCELS AND SUPERSEDES EO __."

2. Check the original EO out of CEF, run a copy and enter "EO __ CANCELED, SUPERSEDED BY EO __" across the top of the copy; return copy to CEF. Make any changes necessary on the original. Place the new EO number in the title block, add the note "EO __ CANCELS AND SUPERSEDES EO __."

   Note: Remove all signature and CEF issue dates. The new EO must be reviewed and approved by NASA Engineering and NASA Safety then issued through the CEF release system.

8.3.5.2 EO Incorporation

a. When a project is completed all outstanding EOs against a SORD baseline drawing shall be incorporated in chronological order into the drawing.

b. All existing EOs must be reviewed for their technical content so that all affected drawings are revised.

c. If an EO inadvertently omits one or more SORD drawings that are affected by the change that generated the EO, then the EMI shall be revised to include the omitted drawings during documentation update.

d. All revision numbers shall be entered in the symbol column of the revision block.

e. The main plan views, elevations, sections and views shall be reviewed and revised as required.

f. When an EO carries so much delineation that it cannot be incorporated into the drawing against which it was written, a new drawing shall be created.

   1. A new baseline drawing number shall be assigned under authority of the EMI which authorized the original EO.

   2. Cross-reference both the new drawing and the original baseline drawing. Example: "WORK THIS DRAWING WITH XXXXX-XXXX."

g. When adding views, sections, or details to the baseline drawing, use the next unused letter or number available.

h. When deleting notes, leave the number of the deleted note in place with the correct revision symbol. Do not renumber the remaining notes to maintain the numerical sequence.

8.3.6 Field Change Request (FCR)

8.3.6.1 General. The FCR (Form SSC-61) is a subsidiary change document authorizing deviation from a released design package/EMI (Section 8.3.4). It is used to obtain official approval to change the design package/EMI before the EMI is completed and accepted by NASA. Once the approved changes are incorporated and the EMI is closed, a new EMI is required to further change the baseline drawings. Reasons for issuing an FCR include the following: changes in the scope of requestor's requirement, incorporation of construction improvements, deletion of unnecessary features, equipment changes to meet safety requirements or SSC Standards, unavailability or slow delivery of materials, resolution of coordination problems, and changes in technological improvements that may reduce the cost of the project.

8.3.6.2 Disposition. In accordance with SPR 1150.1, all FCRs shall be reviewed and dispositioned (i.e., approved or disapproved) by the appropriate CCB (and/or FRB) responsible for the area and the EMI that is used to create or change SSC facilities configuration baseline (ref. SOI-8040-0001-FACENG). Upon submittal of the COC (ref. 8.3.9), the Construction Monitor or Project Engineer shall provide CEF with a copy of each FCR that has been approved for implementation. (Note: The signature block for the Construction Monitor may be signed by the Project Engineer in cases where the Project Engineer is implementing the changes.)

8.3.6.3 Processing. When incorporating FCRs into the released engineering, sufficient explanation shall be included in the Revision Column on the EMI Document or Parts List. The Revision Column on those documents shall read "Inc. FCR _____." The EMI Package Index Revision Column shall carry the notation "Inc. FCR _____" in addition to indicating those individual documents that have been revised. These FCRs may be incorporated during construction at the discretion of the NASA Construction Management Division Chief following CCB approval, or held until project completion and incorporated per Section 8.3.9. A group of FCRs may be incorporated as a single revision. If FCRs are incorporated into a document during construction, the drawing shall be revised, approved, and released through CEF. Upon receipt of the revised engineering documentation that verifies incorporation of the FCRs, CEF shall archive the FCRs.

8.3.7 Change Request/Board Disposition

8.3.7.1 Change Request. A request for change to SSC facilities configuration baseline, including system components as identified in the Technical Components Configuration database maintained by CEF, is initiated before the change is made. The request shall be submitted to the appropriate

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board (CCB and/or FRB) in accordance with the board's process and documentation requirements. (Refer to SPR 1150.1 and SOI-8040-0001-FACENG.) For changes affecting critical systems under control of the NASA SSC Engineering & Science Directorate (E&SD), change requests shall be made with an Engineering Change Request (ECR, form SSC-650), in accordance with SOI-8080-0015.

8.3.7.2 Board Disposition. The responsible CCB and/or FRB reviews the request for change and approves or disapproves the request.

8.3.8 Certification/Configuration Control Card (CCC)

8.3.8.1 General. The 5-part Certification/Configuration Control Card (CCC) (Form SSC-633) documents the configuration and certification of components that are processed through the Fluid Component Processing Facility and are then stored in the warehouse or installed in the field. It also documents the location and date of installation of the component in the field. All SSC agencies are required to use the CCC.

8.3.8.2 CCC Procedures. CEF shall use the CCC to update the Technical Components Configuration database when components are installed in the field, and the authorizing SWR number is provided in the appropriate place on the CCC. Instructions for CCC processing are provided in SSTD-8070-0006-CONFIG.

8.3.9 Certificate of Completion (COC)

8.3.9.1 General. The COC (Form SSC-625) verifies completion of both subcontractor and in-house construction projects. All Engineering Modification Instructions (EMIs) require a COC, even if the EMI is for procurement only. The COC initiates the updating of SORD drawings and provides for the collection of other documentation applicable to a project. The COC is prepared and completed as specified in SSTD-8070-0009-CONFIG; and CEF distributes the COC and related documentation in accordance with SSTD-8070-0009-CONFIG and SWI-8810-0012-FACENG.

8.3.9.2 COC Documentation. For a COC to be finalized, it must be submitted to CEF with applicable documents from the following list: FCRs; ECRs; redlined construction drawings; SSC facilities equipment list (SSTD-8070-0010-CONFIG); warranty information, operation and maintenance manuals (O&M); manufacturer's spare parts lists; punch lists; revised panel schedules; Dig Permit (Form SSC-618); abatement plan; CCC 5-part card, and NASA Form 1046. CEF shall forward the original NASA Form 1046 to Real Property and copies of all COCs and any applicable associated documents to the appropriate function areas, in accordance with procedures in SWI-8810-0012-FACENG.

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9.0 REPORTS AND STUDIES

9.1 GENERAL

Reports and studies often contain significant amounts of useful data and background information which should be archived for future use, even if the report or study contains recommendations or conclusions which may or may not have been accepted. (The conclusions and recommendations contained in a report or study do not necessarily require follow-up action. They are simply the opinions of the person completing the study.)

The requestor of a report or study receives a draft of the document, accepts it if it meets the initial requirements, prepares written comments, and forwards the document and all comments to NASA Engineering, which adds additional comments and forwards the document and all comments to the contractor. When the review of the document is complete and when all comments have been incorporated or addressed to the satisfaction of NASA Engineering, the contractor forwards the completed report with all comments to Central Engineering Files for archiving and issuance.

The report or study is complete when the requestor accepts the document as meeting the requirements. The basic document will not be changed after acceptance, and all funding will cease. Additional work scope or follow-up effort will require separate funding in accordance with normal procedures.

9.2 REQUIREMENTS

9.2.1 Requestor. Requestors are responsible for the following.

a. Insure that adequate funding is available for the report or study.

b. Provide clear definition of requirements.

c. Review the completed document and ensure that all requirements have been met.

d. Comment on the document's conclusions and recommendations, attach the comments to the document, and forward the document to NASA Engineering for review.

e. Initiate follow-up actions if appropriate after issuance from CEF.

9.2.2 NASA Project Manager. The NASA assigned Project Manager will be responsible for the following.

a. Review the report or study and comment if appropriate.

b. Attach comments to the document and forward to performing contractor (if an off site contractor performs study then NASA may issue the report to CEF).

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9.2.3 Central Engineering Files (CEF). CEF will be responsible for the following.

a. Issue document and all comments with copies to the requestor, to the contractor who wrote the document, and to the NASA assigned Project Manager.

b. Archive the document with comments attached.

10.0 CADD APPLICATION

10.1 GENERAL

10.1.1 Format. All design drawings, except for engineering sketches, shall be created and/or revised in CADD format. All text/specifications that are included in NASA SpecsIntact shall be presented in SpecsIntact. All specifications not in SpecsIntact shall be in the approved site word processing software. Hard copies with 100% replication of the CADD databases shall be provided by CEF for NASA signature. These original hard copies shall be marked for release by CEF prior to archiving.

10.1.2 Backups and Archiving. Retention of backups and archives on electronic media shall be the responsibility of CEF. In addition, CEF shall also be responsible for the issuance and distribution of CADD drawing files or hard copies.

10.1.3 Directories Hierarchy. The Drafting/Standards Manager or designee shall establish and maintain a hierarchy of protected directories and files in the CADD database. Files shall be segregated by type: EMI, SCD, SORD, etc. User access to the database shall be established by the ESD Chief.

10.1.4 Records. Basic records retention policy of 100% redundancy shall be used as a guideline for backup procedures. Outside-contracted Architect & Engineering (A&E) firms shall supply CEF with electronic and hard copies of all drawings.

10.2 DRAWING PRACTICES AND STANDARDS

Drawing practices and standards for the preparation of CADD drawings are defined in SSTD-8070-0002-CONFIG, *SSC Facilities Drafting Manual*.

11.0 RECORDS AND FORMS

Records and forms identified in this SSTD shall be maintained in accordance with applicable requirements of SPR 1440.1. For quality records, refer to the SSC Master Records Index. Forms are assumed to be the latest edition unless otherwise specified and may be obtained from the SSC Electronic Forms repository or from the NASA SSC Forms Management Officer.

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APPENDIX A

ACRONYMS AND ABBREVIATIONS

A&E	Architect and Engineering
CADD	Computer Aided Design and Drafting
CCB	Configuration Control Board
CCC	Certification/Configuration Control Card (form SSC-633)
CEF	Central Engineering Files
CFO	NASA Chief Financial Officer
COC	Certificate of Completion (form SSC-625)
DWG	Drawing
E&SD	Engineering & Science Directorate
ECR	Engineering Change Request (form SSC-650)
EMI	Engineering Modification Instruction (form SSC-151)
EO	Engineering Order (form SSC-151D)
ESD	Engineering Services Department
FCR	Field Change Request (form SSC-61)
FOSC	Facility Operating Services Contractor
FRB	Facilities Review Board
NASA	National Aeronautics and Space Administration
NPR	NASA Procedural Requirements
O&M	Operations and Maintenance
PDS	Project Data Sheet (form SSC-702)
SCD	Specification Control Drawing
SI	International System of Measurements (metric)
SOI	Stennis Organizational Instruction
SOMRD	System Operation and Maintenance Responsibility Database
SOP	Standard Operating Procedure
SORD	Site-wide Operation Repair Document
SpecsIntact	Specifications kept Intact
SPR	SSC Procedural Requirements
SSC	Stennis Space Center
SSTD	SSC Standard
STD	Standard
STE	Special Test Equipment
SWR	Stennis Work Request (form SSC-704)
SWI	SSC Work Instruction

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Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 9

Stennis Space Center Facilities Drafting Manual

Only provided in electronic format

SSTD-8070-0002-CONFIG
Revision A
February 16, 2006

NOTICE:

To access the interactive drafting standard that allows viewing of the figures (example drawings), exit the Tech Doc System and go to the CEF Files Manager web application via the SSC Portal.
Note: CEF Files Manager is a SSC public accessible web application and AutoCad or Voloview software is required. For assistance in loading them to your computer, contact the FOSC systems administrator at ext. 1464.

John C. Stennis Space Center
SSC Facilities Drafting Manual

National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

Original Signed By:

Randall Canady	**07/31/06**
NASA SSC Center Operations	**Date**
Facilities Engineering Division	
Bartt Hebert	**01/30/07**
NASA SSC Propulsion Test	**Date**
Engineering Division	
Issued CEF	**02/09/07**
Central Engineering Files	**Date**

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Status/ Change/ Revision	Change Date	Originator/ Phone	Description
Basic	4/18/01	J. Wolfenbarger X-2304	Initial Release – supercedes SSC STD 66-600, with editing and content changes to text and organization throughout the standard.
Admin. Change	6/29/01	J. Wolfenbarger X-2304	Add Notice to cover page to inform readers how to access figure references.
Admin. Change	7/18/03	J. Kellar ext. 8-3043	Reset links for figure reference access to CAD drawings.
A	2/16/06	J. Hughes X2304	5 year review. Change notice to reflect CEF Files Manager application. Changed titles for signatures per NASA SSC organization changes.

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1.0 INTRODUCTION

1.1 PURPOSE

This Stennis Space Center (SSC) Standard (STD) establishes requirements for creating and maintaining drawings and related technical documentation produced and maintained by means of computer-aided design and drafting (CADD) to define and document the configuration of facilities at SSC.

1.2 APPLICABILITY

This SSC STD (SSTD) complements SSTD 8070-0001-CONFIG and applies to all SSC NASA organizations and contractors, and to all SSC facilities other than SSC test articles, Ground Support Equipment and Special Test Equipment.

NOTE

This SSTD applies only to the preparation of drawings required for "on site" facility construction. Requirements for shop detail and "off site" manufactured equipment are not included.

1.3 DOCUMENT CONTROL

This SSTD shall be controlled, maintained and used in accordance with the requirements of SSTD 8070-0005-CONFIG and Section 3.0 of this SSTD.

1.4 RECORDS AND FORMS

Records and forms identified in this SSTD shall be maintained in accordance with SSLP-1440-0001. For Quality Records, refer to the SSC Master Records Index. All forms shall be the latest edition unless otherwise specified. Forms may be obtained from the SSC electronic forms repository, or from the SSC Forms Management Officer, or from Central Engineering Files (CEF).

2.0 REFERENCES

References are assumed to be the latest edition, unless otherwise specified.

AISC M013 Detailing for Steel Construction

ANSI Y32.2	Graphic Symbols for Pipe, Filters & Valves; HVAC; and Heat Apparatus
ASME B1.1	Unified Inch Screw Threads
ASME B1.5	Acme Screw Threads
ASME B1.20.1	Pipe Threads, General Purpose
ASME B1.20.3	Dryseal Pipe Threads
ASME B1.20.5	Gaging for Dryseal Pipe Threads
ASME B1.20.7	Hose Coupling Screw Threads
AWS A2.4	Standard Symbols for Welding, Brazing and Nondestructive Examination
DWG 53000-E001	Standard Electrical Symbols
DWG 53000-E002	Standard Instrumentation Symbols
DWG 54000-P001	Legend for Piping Schematics
IEEE STD 315	Graphic Symbols for Electrical and Electronics Diagrams (Including References Designation Class and Designation Letters)
IEEE STD 315A	Supplement to Graphic Symbols for Electrical and Electronics Diagrams (Supplement to ANSI Y32.2 and IEEE STD 315)
MIL-STD-12	Abbreviations for use on Drawings and in Specifications, Standards and Technical Drawings
NPD 8800.14	Policy for Real Property Management
PTD OI-E01	Test Site Drawings
SSC-97-009	Technical Systems & Facilities Systems Conduit Identification Number Control
SSC-99-006	Preparation of Construction Specifications

SSLP-1440-0001 SSC Records Management Program and Control of Quality Records

SSTD 8070-0001-CONFIG SSC Facilities Engineering Documentation Standard

SSTD 8070-0005-CONFIG Preparation, Review, Approval and Release of SSC Standards (SSTD's)

SSTD 8070-0006-CONFIG Component Servicing Documentation

3.0 RESPONSIBILITIES

Responsibilities for the maintenance, control, use and application of this SSTD are as follows.

a. The NASA SSC Center Operations and Support Directorate (COSD), Facilities Engineering Division (FED) is primarily responsible for the content of this SSTD; however, the COSD and the NASA SSC Propulsion Test Directorate (PTD) are both responsible for the review and approval of all changes to this SSTD in accordance with SSTD 8070-0005-CONFIG.

b. The Facility Operations and Support Contractor (FOSC) Engineering Department is responsible for the maintenance of this SSTD in accordance with SSTD 8070-0005-CONFIG.

c. The Test and Technical Support Contractor (TTSC) and other SSC contractors and subcontractors are responsible for supporting reviews of revisions to this SSTD in accordance with SSTD 8070-0005-CONFIG.

d. CADD supervision and Central Engineering Files (CEF) are responsible for maintaining libraries, directories and procedural guidelines as specified in this SSTD.

4.0 DRAWINGS – GENERAL INFORMATION

4.1 FACILITIES CONFIGURATION

The design package for construction of new or modified facilities is comprised of the set of drawings and the construction specification – an engineering document that provides clear, accurate descriptions of technical requirements for items, materials, utilities and services, including procedures by which it will be determined that design requirements have been met. It also provides scope of work and other information, including general design requirements and applicable industry, government or SSC standards and codes. (Ref. SSTD 99-006.)

The drawings complement the specification by illustrating the facilities configuration and providing detailed technical information to ensure that the construction requirements are met and the configuration integrity is maintained. Changes to the SSC facilities configuration (i.e., construction of new facilities or modification of existing facilities) are authorized in accordance with SSTD 8070-0001-CONFIG and this SSTD.

NOTE

If ever drawings and specification conflict, the specification governs.

4.2 DRAWING TYPES

Various types of drawings are required to define the construction requirements of any sizable facility. Maps and site layout drawings may be prepared to ensure the feasibility of constructing the planned facilities on the selected site. Preliminary study drawings (design criteria drawings) for the principal facilities may be needed to determine general requirements (e.g., size, location and arrangement) and to describe the general proposed design. Final construction drawings may be required for a specific engineering discipline (e.g., civil, architectural, structural, mechanical or electrical), or for a site-wide system, or for a single component, such as a valve. When part of the SSC Site Operation and Repair Drawing (SORD) system, facilities drawings define and document the SSC facilities configuration. Facilities drawings are defined in more detail in section 5.2.

Most detailed facilities drawings are prepared to delineate the work of a single contractor or subcontractor, such as work required for the forming, reinforcement, and pouring of a reinforced concrete floor. Other drawings are required for installation in the floor of associated components, such as conduits and boxes for lighting and electrical outlets, or for setting sleeves in the floor for pipe penetrations. Accordingly, drawings prepared for the various craft work are supplementary to each other and are assembled in groups that correspond to the engineering discipline (i.e., civil, architectural, structural, mechanical, and electrical) or to the engineering function (e.g., piping, welding) to which they apply. When joined with the vicinity map/drawing index, they constitute a facilities drawing set, which is described in more detail in paragraph 5.2.4.

5.0 DRAWING REQUIREMENTS AND PRACTICES

This section is divided into thirteen subsections as listed in the table of contents. Information is organized as follows.

- General requirements and principles applicable to all drawings and related CADD/drafting functions are provided in section 5.1.

- Detailed requirements and practices applicable to facilities drawings, including the vicinity map/drawing index, the specification control drawing (SCD) and the engineering modification instruction (EMI), are provided in sections 5.2 through 5.8.

- Detailed requirements and practices applicable to all drawings in general (including drawing revisions) are provided in sections 5.9 through 5.13.

- Detailed requirements and practices applicable to drawings for a specific engineering discipline (i.e., civil, architectural, structural, mechanical, and electrical) are provided in sections 6.0 through 10.0.

5.1 GENERAL REQUIREMENTS

The prime objective of engineering drawings is to convey to the user complete, accurate, concise, and clear information, with a minimum of drafting time. The lines and work descriptions must convey the design intent. The drafter shall use the guidelines in this SSTD to ensure that the drawing provides exactly the amount of detail required to convey the design, and to construct.

5.1.1 Basic Principles

Proper planning, elimination of non-essentials, use of all available tools, and increased knowledge of the purpose of the drawings are the basis of functional drafting, the principles of which, when implemented properly, will reduce drafting time and provide drawings that are easily interpreted. The following principles of functional drafting are applicable to all areas of drafting.

a. Use minimum number of views.

b. Avoid use of pictorial or repetitive details.

c. Communicate requirements through the clearest possible means.

d. Increase the use of standard drawings.

e. Show partial views of symmetrical objects.

f. Use sectioning only when necessary.

g. Tabulate parts on drawings where possible.

h. Enlarge small details on large parts for clarity when practical.

i. Use descriptive notes to eliminate repetitive dimensions and data.

j. Substitute recognized symbols for delineation of commonly used objects.

k. Avoid duplication of information contained in the specification.

l. Keep the number of drawings for a facility to a minimum. (When possible, combine drawings or, for smaller facilities, combine several functional sections on one drawing.)

5.1.2 Back-up Requirements

The basic records retention policy of 100% redundancy shall be used for back-up procedures. All active user files and the holding files should be backed-up daily. All files should be backed-up weekly or as often as the holding files are purged. All files should be backed-up at least monthly. Disregarding work performed within the last 24-hour period (prior to daily back-up), there should at all times be at least two copies of all essential files: one on the database and one on storage. The most recent back-up should be stored in a fire resistant cabinet.

5.1.3 Drawing Details

Standard details shall be used to eliminate unnecessary duplication of work. Standard libraries shall be developed and maintained for this purpose. CADD supervision shall be responsible for developing standard practices and procedures for the use of layers, colors, and similar devices in order to minimize unique and individual approaches to the creation of drawings, parts, models, etc., except where they contribute to productivity or clarity. Drawing details are discussed more fully in paragraph 5.12.3.4.

5.1.4 Similar or Identical Graphic Symbols

When graphic symbols having different meanings but similar shapes are shown on the same drawing or set of drawings, steps must be taken to avoid misinterpretation of the symbols. Such steps might include reference or caution notes and comparison charts which properly identify and illustrate the similar symbols. This requirement is especially critical if the graphic symbols are from different disciplines and represent devices, conductors, or lines of flow that if misinterpreted might damage the equipment or jeopardize the lives of servicing or operating personnel.

5.1.5 Graphic Symbols Used in Existing Technical Documents or Drawings

Unless otherwise specified, any changes or revisions to an existing drawing, specification, standard, or technical document prepared under a previous edition of this standard or superseded military standard may use the latest graphic symbols, although the superseded graphic symbols may appear elsewhere in the document or drawing.

5.2 FACILITIES DRAWINGS

5.2.1 Definition

Facilities drawings define the design of buildings, structures, sites, or related construction either individually or in groups.

5.2.2 Requirements

A set of facility drawings shall establish all the interrelated elements of the design, including pertinent services, equipment, utilities, and other engineering features.

5.2.3 Types and Definitions

Facilities drawings are of two categories, each comprised of various types of drawings, the definitions, requirements and practices for which are detailed in applicable sections of this SSTD as follows:

a. <u>drawings that are generally applicable to all, or the majority, of the engineering disciplines and/or to all areas of facilities design</u>
Vicinity Map/Drawing Index (5.2.4)
Tabulated Drawing (5.3)
Modification Drawing (5.4)
Vendor Information Drawing (5.5)
Specification Control Drawing (5.6)
Building Plans Manual Drawing (5.7)
Technical Systems Drawing (5.8)

b. <u>drawings that deal specifically with a particular engineering discipline</u>
Civil – location and development of the site (6.0)
Architectural – floor plans, elevations, sections, and structure details (7.0)
Structural – structural steel, reinforced concrete, and special structures (8.0)
Mechanical – arrangement of mechanical systems such as HVAC, plumbing and process piping (9.0)
Electrical – details for installation of power, lighting, communications and control equipment (10.0)

5.2.4 Drawing Sets

Facilities drawings are customarily bound in sets prior to release for bidding or other purposes. The first sheet in the set is the vicinity map and the drawing index, followed by groups of drawings numerically arranged according to engineering discipline by means of a functional code to complete the set. Refer to paragraphs 5.4.1-d.8 and 5.9.2-i.

a. Vicinity Map. This map, and its accompanying Fee Area map, are located on the left side of the first drawing sheet. They illustrate the SSC site, identifying the main structures on the site and delineating its relationship to features of the surrounding area, such as towns, bodies of water, railroads, and highways. Refer to section 6.3.

b. Drawing Index. A listing of each drawing included in the set begins to the right of the vicinity map and may extend beyond the first sheet, if needed. (Ref. Fig. 1.)

5.3 TABULATED DRAWING

The differences (variables) between the items defined by a tabulated drawing shall be tabulated, and fixed (constant) characteristics shall be depicted or stated only once. Normally, a pictorial representation of a single item is shown, with the variable dimensions or other features coded by means of letters that are used as headings for columns in a tabulation. The variables then are entered in the table under the appropriate headings and on the same line as the identifying number for the item to which they pertain. (Ref. SCD Directory on CADD.)

5.4 MODIFICATION DRAWING - EMI

Modification drawings establish the requirements for a modification to a facility or a system. They shall completely define the modification to be made, with sufficient description of the existing facility to ensure continuity between the modified and unchanged areas. In addition, appropriate methods shall be used to differentiate between the modified and existing facility. When used, phantom or light lines shall represent the existing structure, and solid bold lines shall represent the modification.

The EMI (form SSC-151 series) is the primary modification document and is prepared in accordance with the procedures of 5.4.1 and the provisions of 5.4.2 and 5.4.3.

5.4.1 Preparation

a. Engineering shall receive Stennis Work Request (SWR), Field Change Request (FCR), Project Data Sheet (PDS) or other change authorizing document. The change shall then be assigned to the appropriate Design Engineer.

b. The assigned engineer(s) shall prepare instructions as required to perform drafting.

c. The assigned personnel shall generate the EMI Package Index, Form SSC-151A (Fig. 2). Data shall be entered as follows.

1. Name of Contractor (in the PREPARED BY block).

2. Title of Engineering Modification Instruction.

3. An "X" shall be placed in the space indicating whether this EMI package issue is partial or final. Partial issues shall be transmitted for approval for the following reasons only.

   (a) Customer request.

   (b) Advanced Specifications, Drawings, and/or Parts List partial transmittal in order to meet schedule on material long-lead items.

   (c) Instances of mandatory EMI schedule improvement by expediting shop estimates and/or material procurement.

4. Central Engineering Files (CEF) shall enter the issue date of the original issue whether it is a partial or final.

5. Enter the number of the SWR, FCR, or other change authorizing document that authorized the generation of the package.

6. The various documents specifically generated or revised for the change shall be individually entered. If new, an "X" shall be entered in the NEW column. If a revision, the correct revision number shall be entered in the REV. column. Example:

DOCUMENT NO.	NEW	REV.
EMI 90AA8CAB01 M1	X	-
EMI 90AA8CAB01 M2	-	1
EMI 90AA8CAB01 PL 1	X	-
EMI 90AA8CAB01 PL 2	X	-

7. Numbers of various baseline SORD drawings shall be entered. Numbers of Engineering Order (EOs) will be assigned by CEF. Example:

DWG NO.	REV.	EO	NO. OF SHTS
200GF-T001	-	1	-
11CGF-P003	-	1	-

8. The specification shall be entered and the number of sheets. Example:

SPEC NO.	CHG	NO. OF SHTS

200GM-G001 1 84

9. All reference documents, without which a given EMI could not be implemented, shall be entered. Do not enter standard documents such as Operation and Maintenance Manuals which are available for review at CEF or in general use throughout the site. Include page references for implementation reference in large volume documents.

10. Any pertinent comments to NASA, CEF or the implementor will be entered. In the case of projects, reference all applicable EMIs.

NOTE

A note shall be entered when the package has been incorporated or has been reviewed and baseline is not affected.

11. Responsible supervisor's submitted signature and date.

12. NASA Safety Representative's signature and date.

13. NASA responsible individual's signature and date.

14. The original Package Index sheet shall be used for all subsequent issues and a revision entered each time the package is resubmitted, whether the previous issue was a partial release or final release. The responsible individual (13. above) shall initial and date the revision in the approval column. CEF shall enter the issued date.

d. The assigned personnel shall generate the EMI Implementation Document, Form SSC-151-1, Form SSC-151-2, and Form SSC-151B. This is the preferred format for EMIs. However, since many changes are such that they cannot be properly depicted on "A" sized sheets, the "F" sized format as described in Section 5.9 may be used. Multisheet package should generally follow the guidelines in Section 5.2.4 for facilities drawing sets. Data shall be entered as follows. (Ref. Fig. 3, 4, 5, & 6)

1. Name of contractor.

2. Signature and date of the individual generating the document.

3. Signature and date of the individual checking the document.

4. Signature and date of the responsible engineer.

5. Signature and date of the supervisor submitting the package.

6. Signature and date of NASA Safety representative.

7. NASA responsible individual's signature and date.

8. The EMI or other change authorizing document number and the numbers 1, 2, 3, etc., shall be entered. Each EMI document shall be numbered consecutively starting with 1. (The number will be preceded by a letter indicating discipline code.) (Ref. Fig. 7)

9. Title of document and any general notes, such as cleaning, painting, etc., that apply to the particular EMI package or specific notes that apply to that particular document.

10. Delineation and/or instructions required to implement the change. Free-hand delineation may be used if it is neat and legible.

11. A revision shall be entered each time an EMI document is changed. Revisions shall begin with No. 1. The appropriate representative shall initial and date the revision in the Approval column.

e. The assigned personnel shall generate the EMI Parts List. Form SSC-151C (Ref. Fig. 8). Data to be entered as follows.

1., 2., 3., 4., 5., 6., and 7. - Same as for EMI Implementation Document.

8. The EMI or other change authorizing document number shall be entered on the line following "EMI" and the numbers 1, 2, etc., entered on the line following "PARTS LIST NO." Each Parts List (PL) shall be numbered consecutively starting with 1.

9. An "X" shall be placed to indicate an Advance or Final Parts List.

10. Title of EMI Document and any notes that apply to that particular PL.

11. Central Engineering Files (CEF) shall enter the issue date of the original issue whether it is a partial or final.

12. A revision shall be entered each time an EMI PL is revised. A revision shall also be entered when finalizing an Advance PL. Revisions shall

begin with No. 1 and a brief description of the change entered. The engineer, supervisor and appropriate representative shall initial and date the revision in the Approval column.

f. The assigned personnel shall generate the Engineering Order (EO), form SSC-151D. Data to be entered as follows. (Ref. Fig. 9)

1., 2., 3., 4., 5., 6., and 7. - Same as for EMI Implementation Document.

8. Identify title of the drawing against which the EO is being written.

9. Enter the Sheet Number and the total number of sheets in the EO.

10. Enter the SWR or other change authorizing document number which authorized the revision.

11. Enter the EMI number.

12. Enter as applicable:

EMI Document Number
SORD Drawing Number
EO Number

13. The issue date will be entered by CEF.

g. Upon completion of the drawings, the engineering package shall be reviewed and approved by responsible engineer and supervisor, then distributed for requestor approval.

h. Engineering shall obtain appropriate approval and submit to CEF for distribution.

5.4.2 General Provisions

a. When the EMI requires the addition of new equipment or a new facility for which there is no existing baseline drawing, new drawings shall be generated.

b. As required, EOs shall be generated, to document the interfaces and reference the new drawings. The COMMENTS block of EMI cover sheet shall include a note that documents are to be changed to SORD upon completion and receipt of Certificate of Completion (COC, Form SSC-625).

c. Whenever a partial release is made, CEF shall file the originals.

NOTE: The original EMI package index shall always be revised for subsequent releases.

d. Central Engineering Files shall not be contacted for EO assignments until just prior to submitting the EMI package.

e. Documentary Release EMIs shall require only the generation of the package index and the applicable EOs. The words "Documentary Release" shall appear in the "Comments" block, which means the work has been completed before the package is issued.

f. When the EMI requires specifications, the specifications will conform to and utilize to the maximum extent "SpecsIntact."

5.4.3 Revisions

The EMI Documents or Parts List may be revised upon obtaining the originals from CEF. The revised document shall be approved and submitted for the appropriate representative approval. After approval, it will be distributed by CEF.

NOTE

The original package index shall be revised, if any subsequent sheet in the package is revised. In lieu of specifically describing a revision in the Revision Column, a Revision Symbol may be entered adjacent to the changed data, the changed data deleted and new data entered.

5.5 VENDOR INFORMATION DRAWING

A vendor information drawing is supplied to a vendor to set forth the general requirements of an item to be fabricated.

a. The drawing may be used alone or as a supplement to a purchase specification to control functional and physical requirements of the items regardless of the detail design. (Generally, the vendor is required to supply detail design drawings of the item for approval prior to fabrication of the item.)

b. A vendor information drawing shall show only the dimensions, contour, and design data necessary to meet design requirements. It is desirable to allow the manufacturer as much freedom of design as possible, providing specifications are met.

c. Detail requirements, including material, performance, schematics, and test requirements necessary for the intended application, may be prescribed by note(s) or sketch(es) on the drawing, or by a supplementary specification. The supplementary specification shall be referenced on the associated vendor information drawing.

d. It will not be necessary to repeat circuitry or other detail information on facilities drawings when complete vendor drawings have been furnished.

5.6 SPECIFICATION CONTROL DRAWINGS (SCD)

SCDs are prepared to define the specifications required for critical components purchased for SSC. They shall provide adequate information to effectively control the configuration to ensure the component's performance, interchangeability, and reliability.

5.6.1 General

a. SCDs shall be prepared in "B" size (11" x 17") format in accordance with Section 5.9 and shall be comprised of the following. (Ref. Fig. 10.)

b. Signatures shall be entered in the usual manner prescribed for drawings (see Section 5.9.2). The SCD shall be issued and distributed with the original signatures affixed.

c. The text portion of the SCD shall be prepared in accordance with the formats located in the SCD Directory on CADD.

5.6.2 Title Block

The title block shall be completed as follows.

a. Title - New SCDs: The first line shall follow the SORD Drawing Number breakdown with the specific component first and the size last. Example: Valve, Manual 3".

b. Sheet - SCDs are multiple sheets, which will be numbered. Enter SHEET 1 of 5, SHEET 2 of 5, etc.

5.6.3 Revision Block

NOTE

On new SCDs, a space shall be provided 3 inches high, width of Title Block, directly above the Title Block, for subsequent SCD revisions. On revised SCDs, the Revision Block shall contain the following:

a. Symbol - Enter the revision number in this column (i.e., 1, 2, etc.).

b. Zone - Not applicable.

c. Description - Enter a brief description of the drawing revision followed by the SWR number authorizing the change.

d. Approvals - Revisions require checker's initials and date and NASA signature (or initials) and date.

e. Date - Enter the date the revised engineering is released for NASA approval.

f. Issued Central Engineering Files (Date) - CEF shall enter the "Issued CEF and Date" indicating official issue of the drawing revision after NASA approval.

5.7 BUILDING PLANS DRAWINGS

Building plan drawings are maintained in conjunction with the Building Plans Manual to define the latest building configurations and space allocations. (Ref. Fig. 11)

a. Building plans shall be drawn to scale of 1/8" = 1 foot depicting exterior walls, interior partitions, windows, doors, other wall and/or floor openings, column lines (where applicable) and room identification numbers. Junior partitions, generally, are not shown.

b. Drawings shall be updated as directed by NASA Facility Engineering Division (FED).

c. An overlay shall be prepared to reflect space allocation and area (square footage) in accordance with the following schedule.

1. Office space (OF)

2. Laboratory (LA)

3. Technical (TC)

4. Conference (CN)
5. Shop - Industrial (SH)
6. Storage (ST)
7. Miscellaneous (MS)
8. Circulation (hallways) (CR)
9. Mechanical (ME)
10. Custodial (CS)

d. The total net usable area (square footage) is shown as defined in NPD 8800.14.

Drawings shall be prepared on "F" (28" x 40") size format on the SSC Engineering CADD System. Line work and lettering shall be such that differences in line/wall types, as well as lettering is clearly legible when reduced to "A" sized (8 1/2" x 11"). All text shall be on a separate layer in the CADD database.

Each drawing shall be identified by the building or structure number of the building or structure shown.

Revision numbers/letters shall not be used but currentness shall be indicated by affixing the date of the last update. (Ref. Fig. 11)

5.8 TECHNICAL SYSTEMS DRAWINGS

There are nine types of technical system drawings, the definitions, requirements, and practices for which are detailed in the following subsections. Additionally, drawings prepared for NASA SSC PTD shall be in accordance with PTD-OI-E01.

5.8.1 Advanced Schematics

An advanced schematic shows, by means of graphic symbols, the point by point electrical connections and functions of a specific circuit. This schematic facilitates tracing the circuit and its functions without regard to the actual physical size or shape of the component or parts within an assembly. The advanced schematics shall be developed so they can be read functionally, top-to-bottom, or consistent with the existing advanced schematics within the same system. These advanced schematics shall be primarily mono-system with interfacing systems shown for reference only. These drawings shall be identified as drawing type K (Ref. Fig. 12 & 13).

a. Symbols. Size and interpretation of symbols shall be in accordance with drawing 53000-E001. (Ref. Fig. 14)

b. Reference Drawing Block.

1. Each drawing reference on the field of the drawing shall be shown in the reference drawing block located in the upper right-hand corner.

2. The standard electrical symbols, drawing 53000-E001, shall be referenced.

3. Each advanced schematic shall reference the first sheet (Block Diagram) of its respective system.

c. Area Divider Lines. Each building or specific area shall be separated by a phantom line (— · · — ·) approximately 1/16-inch thick.

d. Equipment Identification. Equipment units referenced on the field of the drawing shall be outlined with a phantom line approximately 1/16-inch thick. The drawing number for the sub-assemblies shall appear or be referenced within the confines of this phantom line.

e. Circuit Arrangement. Each circuit shall be labeled with its verbal function directly above the functional circuit. The circuit and its end items shall be arranged to provide a clear distinction of one circuit from another.

f. Terminations. All termination points shall be shown and the terminals identified by 1/8-inch high numbers.

5.8.2 Advanced Schematics - Instrumentation

Advanced Schematics - Instrumentation shall be generated in compliance with the rules of paragraph 5.8.1 with the following exceptions.

a. More than one system may be shown on the advanced schematics if there is an inter-relationship between these systems; depicting them would more clearly define each system.

b. The symbols shall be in accordance with standard instrumentation symbols, drawing 53000-E002. These shall be designated as drawing type K. (Ref. Fig. 15)

5.8.3 Block Diagram

A block diagram is a single line drawing with block outlines to designate units of functional groups or system definition. The block diagram shall be Sheet One in the package of system advanced schematics. The block diagram shall be primarily mono-system with interfacing systems shown for reference only. The drawing shall be developed from top to bottom.

a. Symbols are required only when bussing diagram is shown on block diagram. Size and interpretation of symbols shall be in accordance with drawing 53000-E001 or drawing 53000-E002 for instrumentation systems.

b. Reference Drawing Block.

1. Each drawing reference on the field of the drawing shall be shown in the reference drawing block, located in the upper right-hand corner.

2. The standard applicable symbol drawing shall be referenced.

3. Each advanced schematic drawing number in the system shall be referenced.

4. Each block diagram shall reference the piping schematic for the same system, if one has been, or is being made. The piping schematic legend sheet 54000-P001 Sheets 1, 2, & 3 shall be referenced in these cases. (Ref. Fig. 16, 17 & 18)

c. Area Divider Lines. Each building or specific area shall be separated by a phantom line (— · · — ·) approximately 1/16-inch thick. Size of lettering depicting specific areas shall be 1/4 inch.

5.8.4 Cable Schedules and Wire Schedules

a. Cable schedules are a tabulation listing of all cables installed for technical systems usage. Each cable shall be listed by cable type. Length of the cable, routing, terminations and "from" and "to" information shall be provided. (Contact CEF for cable number assignment and control.)

b. Wire schedules are tabulation sheets of point-to-point terminations. This information shall be shown on termination sheets or wiring diagrams where they exist in lieu of wire schedules.

NOTE

New systems or facilities shall be documented by termination sheets and wiring diagrams, not by wire lists.

5.8.5 Conduit Schedules (Maintain for Historical Reference)

Conduit schedules are tabulation listings of all new conduit installed for technical systems usage. Each conduit shall be listed by size and approximate length. "From and to" information shall also be provided. See SSTD 97-009 for conduit number assignment and control.

5.8.6 Installation and Equipment Drawings

The drawings are required to document the technical systems equipment installations. The physical location of equipment shall be presented on layout drawings which may encompass an area as small as a panel or relay rack or as large as a building or complex. Where appropriate, the panel sub-assemblies may be combined with the internal wiring diagram. Where large areas are involved, the equipment layout shall be the installation type, and the location of the equipment shall clearly be identified with regard to adjacent buildings or portions thereof. All these drawings shall be designated as drawing type F and shall include the following.

a. Installation Drawings - shall depict the physical installation/location of the equipment.

b. Assembly Drawings - shall depict the delineation of each subassembly and/or part in their physical arrangement and identify each item.

c. Sub-Assembly Drawings - shall depict each part in their physical arrangement and identify each item.

5.8.7 Interconnection Wiring Diagrams

This type of drawing is a form of connection or wiring diagram which shows only external connections between unit assemblies, system component, or equipment. The internal connections of these unit assemblies, system components or equipment shall not be included on this drawing unless absolutely required for clarity.

5.8.8 Wiring Diagram

This type of drawing shall delineate the point to point wiring within an item of equipment, component, assembly, enclosure, or panel. The general physical arrangement of terminations

shall be correct, but there is no requirement for a detailed physical routing of wiring. (This diagram may be shown on the assembly layout.)

5.8.9 Wiring Termination Sheets

These wiring drawings shall depict the wiring interconnections between bays, rack and terminal boxes. They shall show each terminal (used or spare) and the wire termination with a reference to the cable schedule or installation drawing for routing. The destination and drawings to terminate the other ends of the wires and cables shall be referenced. Where wiring termination sheets exist, wire schedules are not required.

5.9 SIZE, FORMAT AND TITLE BLOCK

Standard formats (title blocks) shall be developed for CADDs use based upon forms requirements and in accordance with existing SSC Standards. These standard formats shall be stored in a format directory and copied for use as needed. Once approved for use by CEF, these formats and no others shall be used. (Ref. Drawing Formats, Fig. 5 & 6.)

5.9.1 Format

The drawing format shall agree with the requirements established in paragraphs 5.9.1.1 through 5.9.1.6.

5.9.1.1 Revision Block. The revision block shall be located above the title block. On new drawings, a space 3 inches high (minimum) shall be reserved above the title block for revision. The revision block may be continued to the left of, and adjacent to, the original block. The SYM, DESCRIPTION, DATE and APPROVED columns shall be included on all drawings. The ZONE column shall be included on "C" through "F" sizes only.

5.9.1.2 Zoned Border. Vertical and horizontal zoning shall be used on "C" through "F" size sheets and shall be identified by alphabetical (upper case) and numerical entries in the margin spaces (Ref. Fig. 6).

5.9.1.3 Parts List and Schedules. Refer to paragraph 5.12.4 for the appropriate arrangement of specific parts lists and schedules.

5.9.1.4 Notes. When used, notes should be located in the upper right portion of drawing.

5.9.1.5 Symbols Legend, and Graphic Scales. This type data and similar data may be located as shown on Ref. Fig. 19 (Graphic Scale) & 20 (Symbols Legend).

5.9.1.6 Reference Drawings. The drawings and/or specifications referenced in the body of the drawing or those pertinent to the drawing content shall be listed in a central location, preferably in conjunction with the NOTES. (See paragraph 5.12.3.6.)

5.9.2 Completion of Title Block

The title block shall be completed in accordance with the following instructions. Additions to this title block for other resident agency requirements may be added as necessary.

a. Signatures and Dates

1. The responsible drafter, checker, and engineer shall sign and date on the appropriate line.

2. The signature date shall be indicated in the month-day-year form, i.e., 09-15-00.

b. Title

1. For new baseline drawings, the first line shall follow the SORD drawing number breakdown with the specific system stated first, drawing type next and location last (Building number only).

Example: Nitrogen System
Piping Schematic
Building 4122

2. For new assembly or standard drawings, the first word shall be the proper noun identification of the drawing subject.

c. NASA Identification

As Shown (NASA logo and FOSC name).

d. Authority

Enter the applicable document authorizing the work being documented, ie. SWR.

e. Size

Enter the drawing size letter in this block. The letter is usually preprinted in the drawing format.

f. Drawing Number

Enter the drawing number in this block and in any auxiliary number blocks. These drawing numbers are assigned and controlled by CEF and shall be entered on the "Used On" drawing list.

g. Revision

For new drawing, enter “0” (zero). Enter latest revision number when a change is made to the drawing; e.g., 1, 2, 3, etc.

h. Numbering of Sheets

Generally, drawings shall be single sheets, except where there is a clear advantage to doing a multiple sheet drawing. Sheets shall be numbered consecutively for the complete set of drawings. If a new sheet is added to the set by revision, it shall be assigned the next consecutive sheet number. Note: Multisheet drawings require supervision approval and shall be numbered as in the following example.

First Sheet - SHEET 1 of 64 (first sheet only)
Second Sheet - SHEET 2
Third Sheet - SHEET 3
Final Sheet - SHEET 64

i. Functional Code Number

The functional code consists of an alphabetic designator, followed by a sequential number. Each code identifies the primary engineering function of the drawing. The codes to be assigned are as follows.

V - Drawing Index and Vicinity Map
C - Civil
A - Architectural
S - Structural
M - Mechanical
E - Electrical

It is desirable that the functional code numbers be in numerical sequence. If a drawing sheet is canceled, that fact should be noted in the drawing index; however, the functional code of the sheet is not reassigned.

For example, the functional code number "E66" indicates an electrical drawing and that it is the 66th drawing in the set of electrical drawings, provided that the code numbers are assigned in numerical sequence.

j. Issued CEF (Date)

Central Engineering File (CEF) shall enter the "Issued CEF" (and Date) indicating official issue of drawing after customer approval.

k. Submitted

The responsible supervisor shall sign and date indicating his release for NASA approval.

l. Approved

NASA responsible individual shall sign and date.

m. Used On

Each drawing shall be listed on a drawing list. The drawing list number shall have the same first five (5) digits as the drawing number, followed by "-D001". Example: 200GF-D001

n. Name

FOS Contractor/Originator

o. Symbol

Enter the revision number (1, 2, etc.) in the SYM column.

p. Zone

Enter the zone(s) as designated by the numbers and letters in the drawing margin, where the drawing was revised.

q. Description

1. Engineering Modification Instruction Support: Enter "INCORPORATED SWR _____ DWG. A1" for EMIs that were not EO'd.

2. Engineering Order Incorporation: Enter "INCORPORATED EO 1 per SWR _____".

3. Field Change Request Incorporation: Enter "INCORPORATED FCR NO. "X" (where X = FCR number).

r. Approvals

EMI revisions require FOSC Engineering Management and NASA approvals.

s. Date

Enter the date the revised engineering is released for NASA approval.

t. Issue CEF (Date)

CEF shall enter the "Issued CEF" (and Date) indicating official issue of the drawing revision after NASA approval.

5.10 SCALES

5.10.1 General

Drawing delineation shall be to a definite scale(s) in order to quickly convey the true proportions of that which is represented. Diagram drawings, certain pictorial drawings, and portions of other drawings that are tabulated or contain break lines are exempted.

5.10.2 Selection and Tolerance

The scale(s) selected for a particular plan, elevation, view, section, etc., shall be the optimum for minimum size for maximum clarity unless otherwise directed under Sections 6, 7, 8, 9, and 10 of this SSTD. The eventual use of half-size reproductions shall be kept in mind when making this selection.

5.10.3 Recording Scale on Drawings

5.10.3.1 General. All drawings for which true physical size orientation is required shall indicate the scale or scales selected for drawing delineation. This indication shall be placed immediately to the left of the title block. If the drawing has more than one scale, all scales used shall be shown and the scale or scales of each section, detail view, and plan shall be placed immediately below the delineation.

5.10.3.2 Form of Scale Indication. The graphic form used in scale indication shall be the bar, subdivided appropriately. The bar graph scale indication shall be used for uncommon scales such as those used on maps and civil drawings. This form of scale indication is not necessary for common architectural or mechanical scales. (Ref. Fig. 19)

5.10.3.3 Dimensions Not to Scale. Dimensions changed without a corresponding change to the scaled delineation are permitted within the requirements of paragraph 5.13.3.2.

5.11 DIMENSIONS AND TOLERANCES

5.11.1 Scope

This section establishes the general principles of dimensioning and tolerancing required to define the geometric characteristics of objects delineated on facility drawings.

For specific methods of dimensioning and tolerancing in the various fields of facilities work (engineering disciplines), the appropriate one of the following sections should be reviewed.

Civil - Section 6.
Architectural - Section 7.
Structural - Section 8.
Mechanical - Section 9.
Electrical - Section 10.

5.11.2 Purpose

The purpose of this section is to establish uniform practices for stating and interpreting general dimensioning and tolerancing requirements shown on SSC facility drawings.

5.11.3 Definitions

5.11.3.1 Dimension. A dimension is a numerical value expressed in an appropriate unit of measure. It is indicated on drawings in conjunction with lines, symbols, and notes to define the geometrical characteristics of the required work.

5.11.3.2 Limits. Limits are the maximum and minimum values prescribed for a specific dimension. Limits may be of size or location, depending upon the application.

5.11.3.3 Typical. The term "typical," when associated with a dimension, means that this dimension applies to all features that are clearly discernible as being identical in size and configuration. The tolerance stated for a dimension labeled "TYPICAL" or "TYP" also applies to each identical feature.

5.11.3.4 Tolerance. A tolerance represents the total amount by which a specific dimension may vary from design size. The tolerance is limited by maximum and minimum values and is the difference between such values.

5.11.3.5 Reference Dimension. A reference dimension is a basic dimension used for reference purposes only. A reference dimension shall not be used for control of construction or manufacturing operations. A dimension used for reference purposes shall be marked "REF."

5.11.3.6 Size. Size is a designation of magnitude. When a value is assigned to a dimension, it is hereinafter referred to as the size of that dimension.

NOTE

It is recognized that the words "dimension" and "size" are both used at times to convey the meaning of magnitude.

The nominal size is the designation that is used for the purpose of general identification. Example: 1/2-inch pipe.

The basic size is that size from which the limits of size are derived by the application of allowances and tolerances.

An actual size is a measured size.

5.11.4 Types of Dimensioning

5.11.4.1 General. Dimensioning must clearly and explicitly indicate the size and location of all features shown on the drawing which are necessary to the construction.

5.11.4.2 Angular Dimensioning. The angular dimensioning system is a method for indicating the position of a point, line, or surface by means of linear dimensions and angles, other than 90-degree angles implied by the horizontal or vertical centerlines.

5.11.4.3 Rectangular Dimensioning. The rectangular dimensioning system is a method for indicating distances, locations, and sizes by means of linear dimensions measured parallel to reference lines or planes which are perpendicular to each other.

5.11.4.4 Grid Dimensioning. A system of dimensioning wherein dimensions are located from established grid lines.

5.11.4.5 Elevation Dimensioning. A system of dimensioning for indicating elevations from a pre-established datum.

5.11.5 Fundamental Rules for Dimensioning

5.11.5.1 Duplicate Dimensioning. Each construction or installation dimension shall be shown once. Duplicate dimensioning causes difficulties when changes or corrections are made on the drawings at a later date. When it is necessary to repeat a dimension, it should be marked "REF." (See paragraph 5.11.3.5.)

5.11.5.2 True Shape. When possible, dimension each feature in the view where its true shape, plan arrangement, or profile appears.

5.11.5.3 Standards. When possible, specify dimensions to make use of readily available standard parts, materials, tools, fabrication techniques, and inspection methods.

5.11.5.4 Complete Definition. Show dimensions without duplications, such that sizes, shapes, distances, and locations are accurately defined, thus minimizing the necessity of calculating dimensions.

5.11.5.5 Single Interpretation. State each dimension so that only one interpretation is possible.

5.11.5.6 Dimensional Relationship. Show the dimensions between points, lines, or surfaces which have a necessary relation to each other or which control the location of other related parts.

5.11.6 Dimensioning Practices

5.11.6.1 How Dimensions Are Indicated. The following rules shall apply.

a. Dimensions that indicate sizes and positions are given as linear distances or as angles. They may be given with dimension lines and extension lines that show their direction and extent, or in the form of notes with leaders that direct them to intended places on the drawing.

b. Numerals indicate the number of units of a measurement. Dimension lines shall not pass through these numerals.

c. In limited spaces, special methods of dimensioning are used.

d. Dimension lines should be aligned, if possible, and should be grouped for uniform appearance.

e. Parallel dimension lines should be placed not less than 1/4 inch apart.

f. No dimension line should be closer than 3/8 inch to the outline of the object.

g. Where there are several parallel dimension lines, the numerals should be staggered to make them easier to read.

h. Centerlines, extension lines, or lines that are part of the outline of the object, or a continuation thereof, shall not be used as dimension lines.

i. Do not use dimension lines as extension lines.

j. Avoid crossing dimension lines whenever possible.

k. Dimensions shall be shown in inches up to 12 inches and in feet and inches above 12 inches.

5.11.6.2 Extension Lines. Usually, dimension lines should not be terminated directly at lines that represent the surface of the actual object portrayed by the drawing. To avoid this, extension lines are used to show where numerical or other expressions are intended to apply. An extension line drawn to an outline representing a surface shall start with a visible gap from the outline and extend about 1/8 inch beyond the outermost dimension line. Extension lines are usually drawn perpendicular to dimension lines but may be at other angles if their meaning is clear.

5.11.6.3 Crossing Extension Lines. Wherever possible, extension lines should neither cross one another nor cross dimension lines. To reduce crossings to a minimum, draw the shortest dimension line nearest to the outline of the object, and adjacent parallel dimension lines, in order of their length, with the longest line being the outermost. Where extension lines cross other extension lines, dimension lines, or object lines, they should not be broken; however, if an extension line crosses a dimension line close to an arrowhead, a break in the extension line is recommended.

5.11.6.4 Extension Lines Through Point Locations. Where a point is located by extension lines alone, the extension lines shall pass through the point.

5.11.6.5 Leaders. A leader is used to direct notes or symbols to the intended place on the drawing and should be an oblique line, extending to mid-height of the first or last letter or digit of the note. Leaders shall be drawn in such manner as to preclude the possibility of confusion with the delineation. If practical, two or more leaders to adjacent places should be drawn parallel.

5.11.6.6 Leaders to Circles, Arcs and Lines. Where a leader is directed to a circle or circular arc, its direction shall be radial. When a leader is directed to a line, its direction shall not form a small angle with the line where it terminates.

5.11.6.7 Improper Use of Leaders. Avoid the following whenever possible:

- Crossing leaders;

- Long leaders;
- Leaders in a horizontal or vertical direction;
- Leaders parallel to adjacent dimension lines, extension lines, or section lines; and
- Small angles between leaders and the lines where they terminate.

5.11.6.8 Numerals in Line from a Datum. When a space is limited, a group of numerals giving dimensions from a common datum line may be placed in a straight line with single arrowheads, each indicating a distance from the datum line. The numerals should be kept close to the arrowheads and a dimension line used only between each arrowhead and its numeral. If practicable, the longest dimension line should be separate and complete.

5.11.6.9 Reading Direction. Dimensions on drawings are shown by either of two methods, unidirectional or aligned. The aligned method is preferred.

5.11.6.10 Unidirectional Dimensions. Unidirectional dimensions are placed to read from the bottom of the drawing. Common fractions are written with the bar parallel to the bottom edge of the drawing.

5.11.6.11 Aligned Dimensions. Aligned dimensions are placed along their dimension lines. Numerals should be readable from the bottom or right side of the drawing.

5.11.6.12 Dimensions With Leaders. In both methods, dimensions shown with leaders should be aligned with the bottom of the drawing.

5.11.6.13 Dimensioning Within the Outline of a View. Dimensions should preferably be placed outside the views. However, when directness of application makes it desirable, dimensions may be placed within the outline of a view.

5.11.6.14 Dimensioning to Hidden Lines. When practicable, avoid indicating dimensions to hidden lines; it is better to dimension another view. A sectional view may be necessary.

5.11.6.15 Decimal Points. Decimal points shall be definite, shall be given sufficient space for legibility, and shall be placed in line with the bottom edges of digits.

5.11.6.16 Dashes. Dashes are used between parts of certain expressions, as 1/4-20, 10'-7". Dashes shall be definite, one letterspace in length, at midheight of the associated letters or digits, and parallel to the direction of the expression.

5.11.6.17 Methods of Indicating Elevations. When a 0'-0" elevation is established on a facility drawing, all appropriate dimensions shall be given in relation to this datum. Elevations above this

datum shall be indicated as being positive (+) and elevations below this datum shall be indicated as being negative (-), e.g., FLOOR PLAN @ EL (+) 12'-6", INVERT EL (-) 3.50, EL AT STA 13+00 = 173.50, BOT OF FDN (-) 6'-4".

5.11.7 Units of Measurement

5.11.7.1 Linear Dimensions. Linear dimensions are most commonly expressed in inches, or in feet and inches. The symbol for the inch is ", and for the foot,'. Omit inch symbols if all the dimensions on a drawing are in inches, except when a dimension is likely to be misunderstood. (Thus 1 Valve should be 1" Valve, 1 Bore should be 1" Bore, etc.). When used, dimensions in feet and inches should be expressed thus: 8'-7", 8'-0 1/4". Notes may be used when appropriate to eliminate the repetitive use of symbols for inches, and feet.

5.11.7.2 Angular Dimensions. Angular dimensions are most commonly expressed in degrees, minutes, and seconds. The numerical values shall be followed by appropriate abbreviation; e.g., 10 DEG, 15 MIN, 45 SEC. The use of symbols for degree, minute, and second shall be avoided because of the difficulty encountered in rendering them in their correct relative size and still provide microreproduction legibility. When degrees are indicated alone, the numerical value shall be followed by the abbreviation DEG. When minutes are indicated alone, the number of minutes shall be preceded by 0 DEG. When desired, the angle may be given in degrees and decimal parts of a degree, and the tolerance in decimal parts of a degree.

5.11.7.3 Metric System. When all dimensions on a drawing are in the metric system, a general note may be added to avoid using abbreviations throughout the drawing. When both inch and millimeter dimensions are expressed on a drawing, the appropriate symbol or abbreviation shall be included with each dimension. The abbreviation for millimeter is "mm". It may be necessary at times to show a dimension in both the English and metric systems.

5.11.8 Tolerances

5.11.8.1 General Construction Tolerances. A tolerance represents the total amount by which a given dimension may vary. A tolerance shall be expressed in the same form as its dimension; the tolerance of a dimension written as a common fraction shall be expressed as a common fraction; and the tolerance of a decimal dimension shall be expressed by a decimal to the same number of places.

NOTE

In facilities work, it is general practice to consider all dimensions shown on the drawing as nominal without indicating limits of tolerance. The specifications normally include requirements as to workmanship and standard tolerances, and conformance with the terms of contract will generally ensure that the necessary tolerancing requirements are met.

However, where a particular dimension is considered critical, an appropriate tolerance shall be specified.

5.12 MISCELLANEOUS REQUIREMENTS AND PRACTICES

5.12.1 General

Generally, the delineation for each engineering discipline (civil, architectural, structural, etc.) shall be confined to its own drawing(s). However, on simple facilities it may be more efficient to combine engineering disciplines on drawings. The number of drawings for a facility shall be kept to a minimum, consistent with clarity for constructability.

5.12.2 Drawing Numbers

A drawing number consists of letters, numbers, or combinations of letters and numbers assigned to a particular drawing or set of drawings for identification. The number of characters in the drawing identification number shall be limited to a maximum of fifteen. Blank spaces are not permitted within a drawing number.

5.12.2.1 Letters. Letters used as part of an identification number or drawing number shall be upper-case (CAPITAL) letters.

5.12.2.2 Numbers. Numbers used shall be whole arabic numerals. Fractional, decimal, and Roman numerals shall not be used.

5.12.2.3 Dashes. Dashes may be used as part of a complete drawing number.

5.12.3 Conventions and Practices

Drawing layers and line weights shall be as required by Sections 6, 7, 8, 9, and 10 of this SSTD, summarized as follows.

DRAWING LAYERS

LAYER	LINETYPE	COLOR
0	Continuous	Black/White (7)
1	Continuous	Black/White (7)
Existing	Continuous	Gray (8)
New	Continuous	Red (1)
Text	Continuous	Black/White (7)
Vport	Continuous	Yellow (2)

Linetype and Entity's Color should be controlled by layer rather than hard setting.

NOTE

Discipline specific layers can be added as needed but a minimum number of layers should be used in order to keep files small and help files run faster.

LINE WEIGHT

COLOR	PEN	PEN WIDTH	WEIGHT
Red (1)	4	0.028	Thick
Yellow (2)	2	0.014	Medium
Green (3)	3	0.020	Medium Thick
Cyan (4)	2	0.014	Medium
Blue (5)	2	0.014	Medium
Magenta (6)	3	0.020	Medium Thick
White (7)	2	0.014	Medium
Gray (8)	1	0.008	Thin

Pen 1 (Thin) Used for Centerlines and Background and/or Existing drawing information.
Pen 2 (Medium) Used for Dimensioning, General Text (all text except drawing “TITLE LABELS”.
Pen 3 (Medium Thick) Used if Pen 2 is too thin and Pen 4 is too thick.
Pen 4 (Thick) Used for New Objects, Text “TITLE LABELS” and other locations where information needs to be emphasized.

5.12.3.1 Lettering. Drawing font shall be "Romans". Inclined or vertical lettering may be used.

Characters may be upper and lower case in gothic or Roman design for "A" size drawings and upper-case Roman only for all other sizes. One style of lettering should generally appear on a single drawing. The minimum height and vertical spacing of lines of lettering shall be 3/32". Character heights for particular items are built-in to the format.

5.12.3.2 Symbol Delineation Requirements. The requirements for lettering and line characteristics apply when delineating symbols.

5.12.3.3 Sections. A section is a view on a cutting plane that shows interior construction.

a. A cutting plane is indicted by a cutting-plane line and may take any direction or series of directions required to describe the construction most effectively.

b. These lines need not be continuous when their direction is clear and they interfere with other information on the drawing.

c. Hidden lines and details beyond the cutting plane shall be omitted unless required to define the object.

d. When the scale of a section is not the same as the scale at the cutting plane, the section scale shall be indicated under the section identification.

e. Section or detail identification letters (see paragraph 5.12.3.4) shall be used one time only per drawing. Do not use letters I, O, Q, and X. When more than 22 identification letters are required, letters may be doubled, as AA, AB, AC, etc. Follow alphabetical order, if possible, from the upper left portion of the drawing.

f. When a section is cut on one drawing and delineated on another, the functional code of the sheet which the section is cut from shall appear in the lower left portion of the section bubble and the code for the sheet upon which it appears shall be in the lower right. The functional code is not required when the cut section and delineation are on the same sheet. (Ref. Fig. 21 & 22)

g. All identification letters shall be read from the bottom edge of the drawing.

h. For examples of typical sections refer to the sample drawings in the appropriate sections 6, 7, 8, 9 and 10 of this SSTD.

5.12.3.4 Details. A detail is a view showing a portion of another view in the same plane. Details are usually drawn to a larger scale for clarification.

a. When the scale of the detail is not the same as the scale of the delineation from which it is taken, the scale of the detail shall be indicated under the detail.

b. It is preferable not to rotate a detail. If a detail is rotated, identify the number of degrees of the rotation.

c. A detail shall be identified as shown in Fig. 23.

d. Detail identification numbers shall be read from the bottom edge of the drawing.

e. For examples showing effective use of details for a specific type of drawing, see the sample drawings in the appropriate sections of this SSTD.

5.12.3.5 Drawing Arrangement

a. In plan views, the plan should be oriented such that north is to the top of the drawing. If this is not feasible, north may vary 90 degrees to the left or right of straight up. (See paragraph 5.12.3.8)

b. When plan, elevation, and sectional views are shown on the same drawing, the plan view shall be located in the upper left portion of the sheet, with the front elevation directly beneath the plan.

c. Views shall be arranged so that adjacent sides of the structure will be viewed in sequence, as though circling the structure in one direction.

d. When the plan view is too large to be shown on one drawing, a small key plan shall be placed on each sheet and the specific area appearing on that particular sheet shall be identified on the key plan by cross-hatching.

e. Exterior elevations shall generally be drawn to the same scale as the plan view from which the elevation view is taken. Shading or other artistic embellishments shall not be used unless required for clarity.

f. Third-angle projection shall be used.

5.12.3.6 Drawing Notes. Notes are used on drawings to supply information which cannot readily be presented in other ways or that can be presented more easily in description form. They are used for such a variety of purposes that it is not practical to establish a standard note for every condition. A standard method of applying notes, however, shall be used to maintain uniformity.

The following rules shall apply for all notes.

a. Information conveyed by notes shall be clear, accurate, complete, and capable of only one interpretation.

b. Only common trade terms and words shall be used.

c. Notes shall be as simple and concise as possible.

d. Abbreviations shall preferably be limited to those listed in MIL-STD-12.

e. Notes of instruction shall preferably employ the future tense.

f. Notes which are used often shall preferably be identical in wording.

g. Notes shall not duplicate information recorded in the parts list or repeat dimensions given elsewhere.

h. Notes shall be placed horizontally on the drawing to facilitate reading.

i. Notes shall be cross-referenced when feasible to avoid duplication.

j. Notes shall not be underscored.

5.12.3.7 General Notes

a. Notes of general character, such as finish notes, general tolerances, references to codes and standards, etc., that do not require leaders to indicate where they apply, shall be grouped together near the upper right portion of the drawing. They shall be headed "General Notes" and numbered consecutively, leaving double space between notes.

b. When practical, the general notes shall be listed on the first drawing of a group of drawings which are identified under one functional code.

c. Flag notes are notes which apply to specific views, details, or requirements. These notes may be listed under the general notes. Specific notes not shown on the field of the drawing shall be referenced by the note number within a flag symbol at the part or feature where they apply. (Ref. Fig. 45)

d. When it is required to delete a note from an issued drawing, the note should be deleted and replaced by "NOT USED" and the drawing should be reissued as a revision.

NOTE

The statement that general specifications should contain general and special requirements of the job, material, etc., does not imply that notes are not to be placed on drawings. On the contrary, for facilities drawings, use explicit notes in regard to materials, construction, related drawings, and finishes that are required for use of the construction forces in the field and that are not covered in the specifications.

5.12.3.8 North Arrow. All drawings showing a plan view shall have a standard north arrow placed adjacent to the view and shall be in accordance with Ref. Fig. 44. To maintain a uniform and consistent drawing presentation, the plan view should, if possible, be located to permit the north direction to be at the top of the sheet.

5.12.3.9 Reference Drawings. Reference drawings are drawings which have a direct relationship to the drawing on which they are listed. They assist the user of the drawing by providing a direct reference to drawings which complement the information shown on the drawing being viewed and shall be referenced on the body of the drawing by direct notation or by reference to a general note, e.g., "SEE DWG S14" or "SEE NOTE 3."

For location of reference drawings see paragraph 5.9.1.6.

5.12.3.10 Interface Reference. An interface reference is defined as the point or area wherein a physical and functional relationship exists between two or more parts, systems, or procedures. Interface reference features shall be identified and clearly shown. These features shall include mechanical, electrical, and hydropneumatic equipment, etc. For complete detail identification and description of interface features, the following information, as applicable, shall be listed on the drawing.

- Cross-reference drawing numbers, titles, sheet numbers, and zone locations;
- Affected contract end-item identification number at the interface;
- Interface control drawing number; and
- Location of the interface.

5.12.4 Parts List and Schedules

5.12.4.1 Definition. A parts list or schedule is a tabulation of parts and/or equipment which serves as a guide in material take-off and as an aid in reading and interpreting the requirements of the drawing.

5.12.4.2. Requirements - Parts List

a. A parts list, as required, may be used on electrical and mechanical drawings.

b. A parts list, when utilized, may stand alone or can be located on the drawing.

c. The format for the parts list shall be as shown in Ref. Fig. 8.

d. Additional columns may be added to the parts list format when necessary to meet the requirements of a particular drawing. For example, when the inclusion of an electrical or instrument symbol or reference designation in the parts list will facilitate the interpretation of the drawing, the symbol shall be shown at the immediate right of the quantity column.

e. A parts list shall generally be applicable to one assembly of parts. Parts for more than one assembly may be included in the parts list, providing the majority of parts are common to the various assemblies.

When more than one assembly is shown, the parts list shall clearly indicate which parts are associated with each assembly.

f. On unapproved drawings, the item numbers may be changed, rearranged, and/or removed as required.

g. On approved drawings, the item number of a part which has been canceled shall not be used for a different part. An item is canceled from the parts list by drawing two parallel lines through the space. Revisions to approved drawings shall be made in accordance with paragraph 5.13.

h. Item numbers shall be assigned numerically starting with number one. Item numbers shall not be skipped, i.e., each shall have an item number.

i. The quantity column shall be completed as follows.

1. Counted quantities shall be given in customary trade units.

2. Estimated quantities shall be shown as "37 EST."

j. Ditto marks shall not be used in the description column. If information repeats in succession, it shall be shown on the parts list.

k. A part which is completely defined in the parts list by a description or by reference to an outside source such as a vendor's catalog number or another drawing shall be cross-referenced on the field of the drawing to the parts list by its item number, when required.

l. The 3/8-inch minimum diameter circle enclosing the item number shall be located adjacent to the point of major definition of the part. When required to show these item numbers elsewhere on the field of the drawing, the major definition shall be omitted.

m. For economy of delineation, assemblies composed of a few simple items, not normally subject to disassembly without destruction of design, may be completely described at the detail level and considered as one part.

5.12.4.3 Requirements - Schedules

a. Preference shall be given to placing the schedule on the same drawing that defines the parts listed in the schedule. When this arrangement is not feasible, cross-referencing shall be employed to tie the drawing(s) showing the delineation to the drawing(s) containing the schedule.

b. The format for schedules shall include headings to adequately and systematically define the items tabulated in the schedule. Examples of typical schedules are shown in Ref. Fig. 24, 25, & 26. Additional schedules are shown in Sections 4, 5, 6, and 7 of this SSTD.

5.12.5 Screw Threads

Screw threads shall be specified in accordance with ASME B1.1.

5.12.5.1 Thread Delineation. The screw-thread description gives all the necessary information for the production of the thread. Therefore, in many cases a pictorial representation of the thread serves no useful purpose and is not required. However, when a representation of the thread is necessary, the delineation should be as simple as possible, yet convey the required information.

5.12.6 Acme Threads

Acme screw threads, when specified, shall be based on ASME B1.5.

5.12.7 Pipe Threads

Pipe threads (except dryseal) shall be based on ASME B1.20.1. For dryseal threads, see ASME B1.20.3. For hose threads, see ASME B1.20.7.

5.12.8 Abbreviations

5.12.8.1 Purpose. The purpose of this section is to establish a list of authorized abbreviations to be used on SSC facility drawings. This list is also recommended for use in related technical publications.

MIL-STD-12 is the definitive reference source for abbreviations and shall form a part of this standard.

5.12.8.2 Form. Abbreviations will adhere to the following form.

a. Short Words - All abbreviations of short words are omitted except those established by long standing practice.

b. Periods - Periods are used with abbreviations which spell whole words to provide clarity and avoid misinterpretation.

c. Lettering - On drawings, upper-case letters will be used except where the use of lower-case letters has been established by long practice.

d. Clarity - Abbreviations shall be used only when necessary and when their meanings are unquestionably clear. WHEN IN DOUBT, SPELL IT OUT.

e. Word Combinations - Abbreviations of word combinations shall be used as such and not separated for use singly unless the individual words are listed in the abbreviations. Single abbreviations may be combined when necessary.

f. Hyphens - Spaces between word combination abbreviations may be filled with a hyphen (-) for clarity.

g. Tense and Numbering - The same abbreviations shall be used for all tenses, the possessive case, and the singular and plural forms of a given word.

h. New Abbreviations - Any abbreviations utilized that are not contained in the following listing or in the latest issue of MIL-STD-12 shall be defined on the drawing.

5.12.8.3 General Terms and Abbreviations

ABBREVIATION	TERM
&	And
A & E	Architectural & Engineering
A-E	Architect-engineer
AR	As required
ARR	Arrestor
BR	Boiler Room
BTFLY VLV	Butterfly Valve
C	Centigrade
C of E	Corps of Engineers
CEF	Central Engineering Files
CIN BL	Cinder block
COC	Certificate of Completion
CP	Construction Project
CR	Change Request
CRT	Cathode-ray tube
DL	Drawing List
Doc.	Document
EMI	Engineering Modification Instruction
EO	Engineering Order

F	Fahrenheit
FA	Fire alarm
FBM	Feet board measure
FCR	Field Change Request
FOS	Facility Operating Services
FPM	Feet per minute
FPS	Feet per second
FT	Feet
H	Hydrogen
HP	High Pressure
HPIW	High Pressure Industrial Water
KG	Kilogram
K	Kip (1,000 lb.)
KM	Kilometer
KW	Kilowatt
LABS	Laboratories
LH2	Liquid Hydrogen
L	Liter
MATL	Material
MJ	Mastic Joint
ML	Material List
MSTC	Mastic
NASA	National Aeronautics and Space Administration
N	Nitrogen
O & M	Operations & Maintenance
PL	Parts List
Ref.	Reference
RM	Ream
SORD	Sitewide Operational Repair Documentation
SSC	Stennis Space Center
SWR	Stennis Work Request
U or M	Micron (.001 millimeter)
USGS	United States Geological Survey

5.13 REVISION OF DRAWINGS

5.13.1 Scope

This subsection covers the requirements and methods for revising facilities drawings by identifying and recording revisions on such drawings. Revisions shall be authorized by a properly designated individual before changes to the drawing are initiated. The formal drawing change procedure shall be as described in SSTD 8070-0001-CONFIG.

5.13.2 Definitions

5.13.2.1 Revision. The term "revision" as used herein refers to any change on the drawing after the drawing has been issued.

Administrative changes to correct typographical and other minor errors, including errors of omission, shall be permitted provided the change does not affect the design intent and has the concurrence of CEF, Drafting Supervision, and/or FOSC Engineering Supervision.

5.13.2.2 Revision Symbol. A revision symbol is an identifying letter and suffix number enclosed in an equilateral triangle approximately 7/16-inch in height. (Ref. Fig. 27)

5.13.3 Methods for Revising Drawings

5.13.3.1 Methods. The following methods shall be used when revising drawings.

a. Revision shall be made by removing, crossing out, and adding information.

b. Revised areas shall match the original letter style and line weight.

c. Entries in the revision block shall meet character height requirements of standard 1/8" minimum 3/32".

5.13.3.2 Changes to Dimensions. Any change to a dimension should normally be accompanied by a corresponding change to the delineation. However, it is permissible to leave the delineation unchanged when the new proportion of the part is not noticeably different from the original. In cases where delineation changes do not accompany dimension changes, a wavy line shall be placed immediately below the applicable dimensions to indicate that the delineation is not to scale.

5.13.4 Identifying Revisions on Drawings

5.13.4.1 Use of Revision Symbol. Revision symbols shall be used to indicate the location of revisions in the field of the drawing except where there are many changes in one area on a drawing so that separate revision symbols would crowd the delineation, where a single revision symbol may be used to identify the changes. However, sufficient data shall be included in the revision block to locate, identify and describe the changes. (See paragraph 5.13.5.5.)

5.13.4.2 Location of Revision Symbol. Revision symbols shall be located as near as possible to the notes, lines, views, or dimensions which are changed. Revision symbols should not be placed on the views of a drawing unless it is impracticable to do otherwise. Leader lines may be used in connection with revision symbols when necessary. However, the use of leader lines should be

limited, their length shall be kept to a minimum, and they shall be placed so as to avoid crossing dimension lines whenever possible.

5.13.4.3 Revision Numbers. Arabic numbers shall be used in revision symbols and shall follow in numerical order.

5.13.4.4 Multiple Changes. All changes to a drawing sheet, following its issue, and incorporated at one time, shall be identified by the same revision number.

5.13.4.5 Encirclement of Revised Areas. To help locate revisions, the revised area(s) of the drawing may be encircled. A light-weight spline shall be used for this purpose.

Any existing encirclements shall be removed prior to a subsequent revision.

Encirclement of the revised area(s) of the drawing(s) is used in conjunction with the revision symbol and the description in the revision block.

5.13.5 Recording Revisions on Drawings

5.13.5.1 General. Each revision shall be recorded in the revision block of the drawing in accordance with the requirements on the following paragraphs.

5.13.5.2 Revision Number Location. The revision number pertaining to the particular revision being recorded shall be entered in the revision number column.

5.13.5.3 Revision Description. The appropriate EO and SWR number shall be listed. If incorporating an SWR that did not EO the particular SORD drawing, the EMI drawing (DWG) number shall be specified. Example: INCORPORATED EO 1 PER SWR _____. INCORPORATED SWR _____ DWG. C1.

5.13.5.4 Authentication. Authentication of the revision(s) shall be made in the approval column of the revision block. The approved column shall include at least one authorized person's initials or signature. (See paragraph 5.13.1.) The initials of the individual making the revision shall also be entered in the revision block.

5.13.5.5 Zones. The zone(s) affected by the revision shall be indicated in the zone column when applicable.

5.13.5.6 Extended Revisions. When the normal revision block area on the drawing is filled, revisions shall be placed to the left of, and adjacent to, the original block, space permitting.

6.0 CIVIL DRAWINGS

6.1 DEFINITION

Civil drawings are graphic, symbolic representations of existing and/or planned surface features of a region showing the necessary construction required to develop a site. Natural and manmade features or objects (such as hills, valleys, streams, swamps, buildings and structures, power transmission lines, railroads, etc.) are shown and their geometric configuration and physical relationship to other structures and boundary lines are indicated. Certain important imaginary lines (such as state, community, property, and zoning boundaries, building setbacks, coordinate grid system, etc.) are also indicated for record and reference purposes. In the general planning and layout of construction required to develop a site, drawings are included which depict structure location, grading, roads and paving, underground piping, yard structures, etc.

6.2 PRELIMINARY FIELD INVESTIGATION AND STUDY DRAWINGS

Preliminary field investigation and study drawings are drawings delineating applicable engineering information, criteria, and data required for early evaluation of the adequacy and feasibility of a site(s) to accommodate planned facilities. These drawings are generally used for study, evaluation, and/or presentation and precede construction drawings.

6.2.1 Requirements

The following shall apply when preparing this type of drawing:

a. A coordinate grid of horizontal and vertical lines accurately plotted to scale and identified shall be shown and used as a basis to locate all features.

b. An appropriate scale, such as 1 inch equals 100 feet, (metric 1:100), shall be used.

c. Boundary limits and/or property lines shall be shown. Contours sufficient for planning purposes shall be shown and their elevations given. Every fifth contour line shall be indicated by using a thicker line than the previous four. For example: for 1-foot intervals, the 5-foot, 10-foot, 15-foot, etc. contour lines shall be thicker. For a 5-foot contour interval, the 5-foot, 25-foot, 50-foot, etc. contour lines shall be predominant.

d. Highways and their route numbers shall be shown. Railroads and navigable waters shall be indicated, as applicable. Where feasible, distances to major cities shall be indicated.

e. North arrow orientation symbol shall be shown. Refer to paragraph 5.12.3.8.

f. Subsurface soil boring data shall be recorded. Each soil boring shall be located and numbered. The number and location shall be taken from the soil boring logs or a recorded subsurface investigation report. (Ref. Fig. 28)

g. Natural site features, such as streams, swamps, woods line, rock outcroppings, sinkholes, flood levels, etc. shall be shown.

h. All legal limitations to the use of the site for construction of proposed facilities, such as road, railroad, or utility easements; zoning restrictions; building setback requirements from roads or property lines; building height restrictions; etc. shall be noted or shown, as required.

i. The initial and, where known, the planned facilities requirements, including roads, utilities, waste treatment areas, etc. shall be shown using a dashed line.

j. The utility requirements of the initial and future stages of construction for the facilities shall be shown including the size, availability, and connections to existing utility lines such as water, storm and sanitary sewers, gas or electric lines, etc.

6.3 VICINITY MAP DRAWING

6.3.1 Definition

A vicinity map delineates the geographical relationship of a particular site to the identifiable features of the surrounding areas by incorporating symbols, conventions, and notes in describing the location of the facilities in relation to state and county boundaries, adjacent cities, towns, highways, railroads, airports, bodies of water, etc. A vicinity map may also be used in conjunction with a drawing index. (Ref. Section 5.2.4 and Fig. 1)

6.3.2 Requirements

a. A scale appropriate to delineate the requirements shall be used. A graphic scale indicator shall be included on the drawing. Refer to section 5.10.

b. A symbolic representation of the site in the form of a darkened circle or outline approximating the site configuration shall be shown with respect to state and county boundaries, adjacent cities, highways, railroads, airports, rivers, etc.

c. Highways shall be route numbered and cities, railroads, airports, rivers, and other significant features clearly identified, as required.

d. North arrow orientation symbol shall be shown. Refer to paragraph 5.12.3.8.

e. Mileages to major cities or other points of interest may be given.

6.4 TOPOGRAPHIC MAP

6.4.1 Definition

Topographic maps depict the surface terrain including the geographical positions of natural features as well as manmade works and structures. These maps are used for estimating, planning, site study, and construction purposes.

6.4.2 Requirements

a. Contours of the terrain shall be shown. The contour interval shall be governed by the purpose of the drawing; for example, if a detailed study is required, one-foot contour intervals may be shown. Each contour shall bear its elevation in feet, repeated along its length if necessary for interpretation. (Ref. Fig. 29)

b. When feasible, U. S. Coast and Geodetic Survey topographic sheets may be converted to official drawings and utilized as topographic maps.

c. North arrow orientation symbol shall be shown.

d. A coordinate grid shall be shown from which all features are located.

e. Test wells, soil core borings, reference to field books, location of buildings and utilities, etc. shall be shown as required.

6.5 MASTER PLAN DRAWING

6.5.1 Definition

A master plan drawing shows the limits of features, manmade and natural, of an entire complex or site. It primarily depicts significant surface features of the site topography such as boundary lines, buildings and structures, roads, walkways, parking areas, fences, pools, etc. The master plan presents the entire complex or site on one drawing. Various phases of construction may be defined; and it may also be used for long-range planning and studies. When feasible, a master plan drawing shall be referenced to plot plans, vicinity maps and other drawings, as required, for particular detail.

6.5.2 Requirements

a. A coordinate grid shall be shown.

b. A scale appropriate to delineate the requirements, such as 1 inch equals 100 feet, (metric 1:100), shall be used and a scale indicator included on the drawing.

c. Boundary limits and property lines shall be shown.

d. Highways and their route numbers, railroads, and navigable waters shall be indicated.

e. Natural site features, such as streams, swamps, woods line, rock out-croppings, sinkholes, flood levels, etc. shall be shown.

f. All legal limitations to the use of the site for construction of proposed facilities, such as roads, railroads, or utility easements, zoning restrictions, and building set-back requirements from roads or property lines shall be noted or shown.

g. All on-site access or service roads and main utilities shall be shown.

h. A solid line shall be used to indicate existing construction and a dashed line shall be used to indicate proposed construction.

6.6 PLOT PLAN

6.6.1 Definition

A plot plan drawing is an engineering drawing showing surface features, the location of structures, a facility, or a group of facilities on a site. The delineation of the drawing shall incorporate symbols, conventions, dimensions, notes, etc. to locate facilities and utilities such as buildings, roads, walks, tile fields, pools, walls, electric transmission lines, pipe lines, etc., in relation to a coordinate grid system or other identifiable objects such as bench marks or reference points.

6.6.2 Requirements

a. A scale appropriate to delineate the requirements, such as 1 inch equals 50 feet, (metric 1:50), shall be used. A graphic scale indicator shall be included on the drawing.

b. A coordinate grid system shall be placed on the drawing.

c. Boundary limits and/or property lines shall be shown.

d. Natural features, such as streams, swamps, woods lines, flood levels, sinkholes, etc. shall be shown.

e. Buildings and all utilities, both above and below ground, shall be shown using a solid line. The coordinated location of each shall be given.

f. North arrow orientation symbol shall be shown.

g. Reference to vicinity map and other applicable documents shall be made, when required, to complement delineated information.

h. Existing facilities shall be shown using a phantom line.

i. Utility connections, such as water, sewer, electric power, etc. shall be shown and referenced to their appropriate drawings.

j. Whenever more than one plot plan is required, a key reference plan defining the areas and their relationship with the site shall be employed.

6.7 EXCAVATION PLAN

6.7.1 Definition

Excavation plans are engineering drawings which show the amount of earth to be removed or relocated and conditions governing the removal of such earth.

6.7.2 Requirements

a. A scale or scales appropriate to the requirements shall be used. When sections are required, an exaggerated vertical scale may be used, in which case both scales used shall be listed below the section bubble.

b. A coordinate grid system shall be placed on the drawing.

c. Buildings and utilities, both above and below ground, shall be shown. Existing facilities shall be shown using a phantom line. Relocation of existing facilities, where they interfere with the excavation, shall be shown.

d. Limits of excavation, including top and toe of each slope, shall be given.

e. Slopes of sides shall be given.

f. The piling requirements and other stabilization methods shall be specified, when required.

g. North arrow orientation symbol shall be shown.

h. Reference shall be made to the plot plans and other applicable drawings.

6.8 FINISH GRADING DRAWINGS

6.8.1 Definition

Grading drawings depict the ground surface before and after facilities are built. Whenever the ground surface is altered by construction, a finish grading drawing shall be prepared to show drainage, access, and final elevations of the ground. Finish grading may be combined with a plot plan when finish grading requirements will not interfere with the clarity of the plot plan.

6.8.2 Requirements

a. A scale or scales appropriate to delineate the requirements shall be used. When sections are required, an exaggerated vertical scale may be used and both scales shall be listed below the section bubble.

b. A coordinate grid system shall be placed on the drawing.

c. Structures and utilities, both above and below ground, shall be shown.

d. Existing contours shall be shown using a solid line.

e. Finished grade contours shall be shown using a dashed line.

f. Spot elevations shall be shown at building line, in paved areas, at road intersections, and wherever required for clarity.

g. North arrow orientation symbol shall be shown.

h. Where extensive earth work is anticipated to accomplish the grading requirements, sections may be taken and represented in profile form.

i. Reference shall be made to the plot plan and other applicable drawings.

6.9 PLAN AND PROFILE DRAWINGS

6.9.1 Definition

Plan and profile drawings are engineering drawings that provide construction data for roads, railroads, pipe lines, etc. They delineate on one drawing both the horizontal (plan) and the vertical (profile) location of utilities, such as underground drain lines, roads, railroads, overhead steam lines,

etc. The profile drawings are used to show the relative elevation of points along the utilities route (plan) in relation to the ground elevation. These drawings provide construction data for roads, railroads, pipe lines, etc.

The profile is a "stretched out" elevation at the centerline of the road, railroad, or pipe line being shown in plan view.

Plan and profile drawings are of three general classes:

- Plan with profile at grade,
- Plan with profile above grade,
- Plan with profile below grade.

6.9.2 Requirements

a. The vertical scale is generally exaggerated to emphasize slight differences in elevation. Both the horizontal and vertical scales shall be shown below the view callout.

b. The pipe, road, or railroad in plan view may be represented by having its centerline only shown by a slight thick line.

c. The profile of the pipe, road, or railroad, when it may exceed the upper or lower limits of the profile grid, shall be broken and started again on the profile grid. An accented vertical line shall be delineated and new elevation values given to the horizontal grid lines. (Ref. Fig. 48)

d. All utilities crossing the subject pipe, road, or railroad shall be shown in both plan and profile; and the elevation of the crossing shall be given.

e. Stationing shall be shown on the plan by the use of tick marks on the centerline at even stations and identified by station numbers. Stationing on the profile shall be indicated at the bottom of the profile.

f. Existing contours or grades shall be shown on profile views using a dashed line.

g. Continuation drawings, when used, shall be properly referenced and identified on all applicable drawings.

h. Depending on the class of the plan and profile drawing, other data shall be included as specified in the following appropriate paragraph.

6.9.2.1 Plan with Profile at Grade. This type of drawing is used primarily for the design and construction of roads and railroads and shall contain, in addition to the requirements above, the following.

a. Plan

1. Beginning and end points, and all P.I.s (point of intersections of extended centerlines) shall be given by coordinates on the plan.

2. Stations shall be shown at the beginning and end, at all P.C.s (point of curvature) and P.T.s (point of tangency or curvature ending), and at the intersection of the centerline with all existing utilities on the plan.

3. Complete data on curves shall be given on the plan, such as data for horizontal and vertical curves, as in the following example.

CURVE DATA

P.I. = 14 + 16.43
P.T. = 45º 30' 00"
D = 17º 00' 00" Rf
T = 141.33'

b. Profile

1. On the profile view, the profile shall be shown at subgrade or finished grade with a thick solid line and noted accordingly.

2. All vertical P.I.s and beginning and end of vertical curves shall be stationed and their respective elevations shown on the profile.

3. Middle ordinate and length of each vertical curve shall be shown on the profile.

4. The grade (in percent) shall be shown at all vertical tangents and on the profile.

5. The elevations at all even stations shall be shown on the profile.

6. When feasible, the complete road construction including plan and profile, sections, and description data, shall be given on one drawing.

6.9.2.2 Plan with Profile Above Grade. Drawings of this type are prepared for constructing overhead pipe and electrical transmission lines and shall contain, in addition to the previous requirements, the following.

a. Plan

1. All tie-ins, valves, expansion loops, anchors, supports, and bends shall be shown and located by coordinates or stations.

2. Supports and anchors shall be serially numbered on both plan and profile.

3. Each drawing shall generally include a support schedule covering all supports. The schedule shall list type, height, drawing number, and detail number of the drawing showing the support.

4. Location and amount of cold springing shall be shown on the plan.

b. Profile

1. Elevations at centerline of pipe shall be shown at all supports and anchors. In the case of hanger-type supports, cross-arm elevations may be shown instead of pipe centerline elevations.

2. Length of each pipe span and gradient (in percent) shall be shown.

6.9.2.3 Plan with Profile Below Grade. This type of drawing is prepared for the construction of water, sewer, and other underground lines. In addition to the requirements previously listed, the following shall be delineated.

a. Plan

1. The size, material, and/or pipe code shall be shown.

2. All tie-ins, bends, manholes, valves, and anchors shall be located by coordinates or by stations.

b. Profile

1. The profile shall be drawn at the invert of the pipe and so noted. In those cases where pipes of large diameter are being delineated, both invert and top of pipe shall be delineated in order to show vertical clearances to existing lines crossing the new construction. The existing lines shall be shown using a phantom line.

2. Gradient of line shall be given in percent.

3. All manholes, valves, anchors, etc. shall be located by station and the invert elevation of these points given.

4. The extent of the backfill shall be shown on the profile as required.

6.10 ROAD AND PAVING DRAWINGS

6.10.1 Definition

Road and paving drawings are engineering drawings that delineate the layout and construction of hard-surfaced pavement required to provide a planned vehicular traffic pattern for the facilities. (Ref. Fig. 30)

6.10.2 Requirements

a. Scales suitable for showing the detail required shall be used. A scale indicator shall be placed on the drawing.

b. Road and paving sections shall be shown graphically displaying the basic build-up of the finished surface from the rough grade, including subbase, base, and surface wearing course. Sections normally show layer composition and thickness, crown of paving, shoulder width, ditches, limits of excavations, and side slopes.

c. Concrete paving drawings shall show reinforcement and joint details. Dowels, if required, shall be shown.

d. Pavement widths, radius of intersection fillets, concrete curbs and gutters, painted parking stripes, bumper stops or blocks, and roadway drainage culverts shall be shown, as applicable.

e. When feasible, the complete road construction details including plan and profile, sections, and descriptive data shall be given on one drawing.

7.0 ARCHITECTURAL DRAWINGS

7.1 DEFINITION

Architectural drawings graphically display the architectural requirements for buildings and other structures (including the magnitude, appearance, interior and exterior materials, and location) and

for construction details of walls, partitions, foundations, floors, roofs, doors, windows, etc., and for the location and/or details of equipment such as lockers, shelves, tables, etc.

For structures that are basically structural concrete, structural steel, or a combination of these, the architectural drawings become key or composite drawings. These drawings depict "go together" of all components, plus all other nonstructural details, such as wall and roof materials and application, stair and handrail details, window and louver installation, suspended or acoustical ceiling details, built-in counters, cabinets, etc., and all other miscellaneous steel and iron work.

7.2 PRELIMINARY STUDY DRAWINGS

7.2.1 Definition

Preliminary study drawings are drawings depicting the results of preliminary site investigations and studies covering site conditions, occupancy, design criteria versus funding limitations, etc. The drawings present various solutions for functional planning, structural form, arrangement, and aesthetic treatment of the site, and are used for study and evaluation purposes.

NOTE

Much of the preliminary data obtained and represented on the preliminary study drawings may later be included on the construction drawings.

7.2.2 Requirements

Preliminary study drawings shall be prepared using a small scale for plan views which show approximate sizes, shapes, and interrelationships of the required features and areas. Elevation sketches or freehand perspective views may also be delineated to study relative height and mass of the various components of the project.

7.3 PRESENTATION DRAWINGS

7.3.1 Definition

A presentation drawing depicts a general, realistic picture of the structure and its environment.

7.3.2 Requirements

a. A presentation drawing may include the floor plan and a pictorial representation, which is normally a perspective view showing the exterior of the structure in its completed configuration.

b. The perspective view may also show pertinent features surrounding the facility such as adjacent buildings, foliage, terrain, walks and drives, etc., as well as at least one human figure, 6-feet tall, near the foreground, to assist in conveying relative size.

c. The floor plan shall be drawn to scale and shall include the names, sizes, internal layout, and interrelationship of areas.

d. The floor plan is normally drawn at a small scale and is coordinated with the perspective view. The amount of detail on the floor plan is generally limited to showing exterior walls, interior partitions, window and door openings and, when advantageous, interior furnishings. In addition, the name and size of rooms shall be given (General Office 20'-0" x 40' x 0") and the overall dimensions giving length and width of the structure shall be shown.

7.4 PICTORIAL DRAWINGS

7.4.1 Definition

Pictorial drawings depict a general over-all presentation of an object or complex. They are used in the development of architectural designs to present clear, easy to understand, representations of architectural components. They may also serve as an aid in visualizing an entire complex, site, structure, etc. Pictorial drawings recommended for use on architectural presentations are:

- Isometric drawings; and
- Perspective drawings.

7.4.2 Requirements

a. When isometric drawings are used, "not to scale" delineation may be employed whenever it is desirable to illustrate some particular features in greater detail than others. In preparing these drawings, the axis shall be either

- A vertical axis, with an axis at a 30-degree angle on each side;
- A vertical axis, with an axis at a 45-degree angle on each side.

b. Shading shall be kept to a minimum and used only when necessary to properly clarify a detail.

c. Whenever a complex of structures is to be illustrated pictorially, the arrangement, placement, and interrelationship of elements is normally presented by using a perspective drawing.

d. For perspective drawings of this type, it may be desired to emphasize one or more individual elements within the complex. This is accomplished by selection of the direction from which the view is taken to permit the desired elements to appear in the foreground at larger scale and in a position which displays the desired features of these elements.

7.5 FLOOR PLANS

7.5.1 Definition

Floor plans are views of buildings or structures showing exterior walls; interior partitions; the location of equipment or furniture, windows, doors, and other wall and/or floor openings.

7.5.2 Requirements

NOTE

Where more than one drawing is required to delineate a complete plan, the drawing continuity shall be maintained by using match lines and a key plan on each drawing and by referencing the drawings to each other.

Floor plans depict a wide variety of information of which the following shall be included as applicable: (Ref. Fig. 31)

a. Exterior walls and interior partitions dimensioned in overall length, to offsets, in thickness and location, and construction materials and finish identified by the use of symbols and/or notes to establish the limits of finishes;

b. Window, door, louver, and other interior and exterior wall openings identified by symbols and/or notes, or referenced to a schedule;

c. Columns and column grid identification with dimensions as required to orient and dimension from;

d. Floor conditions such as elevations, slopes, floor drains, thresholds, recesses for mats and troughs, floor finish material, etc.;

e. Miscellaneous fixtures and/or equipment such as plumbing fixtures, fixed tools or machinery, cabinet work, shelving, etc.;

f. Interior features such as vertical air shafts, ducts, pipe chases, elevator and dumbwaiter shafts, ladders, stairways, handrails, etc.;

g. Exterior features such as stoops, ramps, steps, platforms, etc.;

h. Miscellaneous aids to orientation of the drawings such as a north arrow, room or space identification, door swings, vertical direction of stairs, etc.;

i. Location of key structural elements that are influential to architectural treatments such as dropped beams or headers, control joints, expansion joints, etc.; and

j. Interior and exterior dimensions as may be necessary to establish relationship of all elements of a structure, spacing between fixtures, clearances, etc.

NOTE

It is preferable to show dimensions around the outside of the plan view whenever possible. Dimensions on frame plans are given from the outside faces of studs on exterior walls to the centerline of the window or door opening. Stud partitions may be located to the center of the window or door opening, to the center of the partition, or to the stud face. On masonry, outside wall dimensions shall be given from the outer face of the wall to the opening of the window or door, then across the opening.

7.6 ELEVATIONS

7.6.1 Definition

Elevations show exterior or interior wall surfaces and graphically display such things as materials, openings, projections, walls and placement of attachments thereto. (Ref. Fig. 46)

7.6.2 Requirements

The following shall be included if applicable.

a. Elevations shall generally be drawn to the same scale as the floor plan from which the view is taken.

b. Each exterior elevation shall be identified by compass orientation; for example, the east elevation shall be that side of the structure viewed from the east.

c. Roof, floor, foundation levels, wall openings, raised platforms, wainscot, counter tops, shelving, etc. shall be dimensioned as required to establish their vertical placement.

d. Material not otherwise identified shall be identified.

e. The column grid, if applicable, shall be shown.

f. Horizontal dimensions to components not located elsewhere shall be given.

g. The clearance between components shall be given as required.

7.7 SECTIONS

7.7.1 Definition

Sections are views on a cutting plane which depicts internal construction (see paragraph 5.12.3.3). (Ref. Fig. 32)

7.7.2 Requirements

The following shall be included if applicable:

a. A scale large enough to depict the required detail information;

b. Identification of each section;

c. Elevations of roof, floors, and foundation shall be given, as appropriate;

d. Vertical dimensions to establish location of components;

e. Horizontal dimensions to components not located on the plan;

f. Dimensions indicating critical horizontal or vertical clearances;

g. The names and/or room numbers of rooms or areas cut by the section, as required;

h. Column grid, if used.

7.8 DETAILS

7.8.1 Definition

Details delineate features of the construction describing in sections, elevation, or in combination, the selected features which do not appear elsewhere or cannot adequately be shown at the scale used for other delineations.

7.8.2 Requirements

For most convenient use, architectural details pertaining to each separate craft shall be shown together on the same drawing, and, in general, details shall be shown on the drawing to which they apply. When this is not possible, a separate drawing of details shall be prepared. See paragraph 5.12.3.4. (Ref. Fig. 33)

Details shall indicate the following:

- Identification of all materials by direct notation or by reference to a schedule or specific note; and
- Notes and/or dimensions indicating size and shape of all materials shown and, as required, their relationship to each other and to one or more reference points established on other drawings such as column grid, module grid, floor line, etc.

7.9 MISCELLANEOUS DELINEATIONS

7.9.1 Definition

Miscellaneous delineations depict construction information not shown on any other plan, section, or detail.

7.9.2 Roof Plans

7.9.2.1 Definition. A roof plan is a plan of the roof and canopy areas of a structure defining limits, location, and extent of all the miscellaneous features constructed thereon.

7.9.2.2 Requirements. The following shall be included if applicable:

a. A suitable scale, such as 1/8" = 1'-0" or metric 1:100;

b. Outline of roofs, canopies, and penthouses;

c. Expansion joints, gravel stops, flashing, drains, gutters, vent stacks, sky lights, chimneys, etc.;

d. Roof pitches or slopes;

e. All details that pertain to the roof or its features shall generally be shown adjacent to the roof plan.

7.9.3 Reflected Ceiling Plan

7.9.3.1 Definition. A reflected ceiling plan depicts the arrangement, location, and conditions of components incorporated into and/or suspended from the ceiling. (Ref. Fig. 34)

7.9.3.2 Requirements.

a. The plan shall be oriented corresponding to the floor plan.

b. The ceiling features shall be graphically displayed as though their outline had been projected directly downward to the floor.

c. The scale used shall generally be the same as that used on the floor plan.

d. Each room or space shall be identified as required.

e. Ceiling heights of each area and changes in ceiling heights shall be shown as applicable.

f. Ceiling fixtures such as light fixtures, sky lights, air grills, and sound system fixtures shall be shown.

7.9.4 Schedules

7.9.4.1 Definition. A schedule is a tabulated listing of parts, materials, and/or conditions such as finishes.

7.9.4.2 Requirements. Detailed descriptions of doors, windows, and room finishes are generally listed in a tabular form for ease of identification in material take-off and as an aid in reading the drawing.

a. Preference shall be given to placing the schedule on the same drawing pertinent to the data contained in the schedule. Where this is not feasible, there shall be sufficient cross-referencing of applicable drawings.

b. Door schedules show door mark (number), door opening, size, thickness, door type, frame type, and remarks as to special hardware such as weather-stripping, threshold, panic hardware, etc. With the schedule, appropriate details of door frame types and installation will be drawn. In multi-story structures, door marks are assigned according to the floor on which they are shown, i.e., doors on the basement level would be marked 1, 2, 3, etc., on the grade or first-floor level, 101, 102, 103, etc., on the second floor 201, 202, 203, etc.

c. Window schedules show window mark (letter) size, description (usually a recommended manufacturer and model number), and remarks as to weather-stripping, special hardware or glazing, etc. The window marks are assigned letter designations starting with the letter "A." The window mark shown adjacent to its window(s) is cross-referenced to the window schedule by means of the letter designation. With the schedule, appropriate details of window installation shall be drawn.

d. Room finish schedules are used to give detail description of finishes on floors, walls, partitions, and ceilings. A room finish schedule shall show floor elevation, space designation (office, corridor, machine room, etc.), floor material and finish, and remarks as to special treatment or reference to special instructions. (Ref. Fig. 35)

8.0 STRUCTURAL DRAWINGS

8.1 DEFINITION

Structural drawings are engineering drawings that graphically display such items as structural steel framing for buildings, towers, and other structures and the construction details for bridges, barges, manholes, and many other facilities components. These drawings establish the basis for the construction of the structural components of facilities. The delineation of structural drawings, by the use of symbols, dimensions, specifications, schedules, lists, reference codes, etc., describe the size and placement of beams, reinforcing steel, concrete, rivets, bolts, plates, welds, columns, etc.

Structural drawings are of three types:

- Structural concrete;
- Structural steel; and
- Structural shop drawings.

Structural shop drawings (steel fabrication drawings) are not covered in this SSTD. When it is necessary to prepare drawings of this type, the practices and procedures as set forth in the AISC M013 (Detailing for Steel Construction) shall be used.

8.2 STRUCTURAL CONCRETE DRAWINGS

8.2.1 Definition

Structural concrete drawings graphically display foundations, walls, columns, pedestals, pads, pits, footings, tanks, basins, and other facilities components constructed of concrete. These drawings are

the basis from which the forms are constructed to contain the concrete. They also delineate the size, spacing, and placement of the reinforcing steel and, in some cases, provide the reinforcement-bar bending details. Typically, the furnishing, bending, tagging, and delivery of reinforcing steel is done by others; however, should the delivery of reinforcing steel be required, reference should be made to the ACI Handbook for Drafting Practices to be followed.

8.2.2 Foundation Drawing

8.2.2.1 Definition. Foundation drawings are prepared to graphically display the foundation walls, footings, columns, pedestals, etc. and to convey all the information required to construct these components.

8.2.2.2 Requirements

a. Generally, a small scale shall be used for the plan view of the foundation. Sections and details shall be drawn to a scale large enough to portray the concrete reinforcement and other data. The scale shall be noted and a scale indicator(s) shown on the drawing. (Ref. Fig. 36 & 37)

b. Foundation plans shall show the foundation walls, columns, pedestals, etc., using solid lines. Footings for walls, columns, pedestals, etc. shall be shown by a dashed (hidden) line.

c. The elevation of the bottom of each footing shall be given [e.g., (-)10'-6"] with respect to an established reference elevation.

d. When column pedestals, etc. are used, a footing and column schedule shall be shown on the same sheet along with a typical footing and wall section.

e. A separate footing plan delineating sizes, shapes, slopes, and other unusual requirements may be prepared for complex foundation systems.

f. When openings occur in foundation walls, they shall be located by dimension and their purpose noted; e.g., "Blockout for Door," "Construction Opening," etc.

g. See Section 8.2.4 for additional detail drafting practices.

8.2.3 Elevations

8.2.3.1 Definition. A structural concrete elevation depicts vertical projections of buildings or structures showing interior and exterior walls, openings, recesses, pipe sleeves, anchor bolts, etc.

8.2.3.2 Requirements.

a. Elevations shall be drawn to the same scale as the plan view when feasible.

b. When the structure is a combination of structural concrete and other components such as structural steel, etc., the elevation shall show only the detail related to structural concrete.

c. Concrete below grade, including footings and foundations, shall be shown using a dashed (hidden) line.

d. All openings are shown and designated, and horizontal, vertical, or diagonal reinforcing are shown.

e. Elevations are noted for each floor, mezzanine, gallery, etc. on the elevation or section. For example, 2nd FLOOREL(+)14'-6".

f. Construction and control joints shall be indicated if applicable.

g. For additional practices, see Section 8.2.4.

8.2.4 General Detail Drafting Practices

a. Dowels shall be detailed, including size and material, with the member to be poured first.

b. When detailing floor slabs whose thickness is less than six inches, check to see that adequate clearance exists between reinforcement and other embedded items.

c. Reinforcement spacing shall be given in full inches whenever possible.

d. When the position of the reinforcement is critical because of effective depth, the position of the bars shall be shown. (Do not rely on construction specifications for minimum coverage.)

e. Slabs supported by steel beams shall be detailed with the bottom of the slab flush with the underside of the top flange of the beam.

f. When a slab crosses a reinforced concrete beam, a beam section shall be shown to illustrate the top beam steel located by dimension.

g. At intersections of a concrete beam and girder, sections of both shall be shown to indicate desired positions of the reinforcing. Usually the girder steel is placed first, the beam steel second, and the slab steel last. Column verticals shall also be located.

h. Anchor bolts, lugs, inserts, corner angles, and all other miscellaneous components that are formed into the concrete are detailed giving material, size, length, projection, thread designation, and amount of thread on anchor bolts, as well as size, length, and connection of corner angles, etc.

i. When a column grid system is used (see Section 8.3.2), all locating dimensions shall be from established column lines. The column grid shall be shown on all plans, elevations, sections, and details as necessary for orientation.

j. Plan dimensioning shall indicate an overall dimension for “out-to-out” of concrete or building line. A dimension shall be given from “out-of-concrete” to “centerline-of-columns” to “out-of-concrete”. Dimensions shall be given to locate exterior wall openings, interior wall lines, etc. and shall be tied to established column lines. Door, louver, and window openings shall be dimensioned “out-to-out” of their formed or rough opening. Walls are dimensioned to their centerlines with thickness shown. Sleeves, anchor bolts, ducts, etc. are dimensioned to their center lines. Dimensions to show openings, offsets, extent, etc. of interior walls shall be from outside face of concrete or shall be tied to established column lines.

k. All vertical dimensions are tied to established floor elevations or the reference datum lines. (See paragraph 5.11.6.17.) When horizontal dimensions are required, they shall be tied to the outside face of the concrete or to established column lines.

l. When a column grid is not used, all dimensions are tied to the outside face of the concrete.

m. Notes common to the structural concrete drawings shall be placed on one drawing, if feasible, and the other drawings shall include the following note: "FOR GENERAL NOTES SEE DWG_____."

8.3 STRUCTURAL STEEL DRAWINGS

8.3.1 Definition

Structural steel drawings delineate the location, size, and connection requirements for all structural steel members required for facilities.

8.3.1.1 Requirements. Structural steel drawings shall, by the use of symbols, conventions, dimensions, reference to codes, and specifications, etc., delineate the construction requirements or provide criteria from which subsequent shop or fabrication drawings may be prepared by others. The size and material of rolled steel shapes, bolts, plates, and rivets, etc., shall be called out on structural steel drawings. In addition, the column grid system and welding requirements shall be indicated.

8.3.2 Column Grid

8.3.2.1 Definition. A column grid is a grid used to locate the center lines of columns and appears on all drawings, such as electrical, piping, architectural, reinforced concrete, etc., and serves as a basis for orientation and a series of datums from which components may be dimensionally located.

8.3.2.2 Requirements.

a. A thin, solid line shall be used to show a column grid.

b. The grid shall be numbered consecutively from left to right and lettered alphabetically from bottom to top. The letters I, O, Q, and X shall not be used.

c. Intermediate or secondary columns not on the main grid are designated by a whole number and a decimal horizontally, and by a capital and lower-case letter vertically. The following guide shall be used for determining these designations: The distance between two established main grid lines is visually divided into tenths, using the decimals .1 through .9 horizontally, and the lower-case letters .a through .k vertically (omitting i). The intermediate column is then given the designation of the main column to the left or to the bottom, plus the nearest tenth. For example, a column occurring midway between established columns 1 and 2 horizontally and A and B vertically would be designated column 1.5 horizontally and A.e vertically.

8.3.3 Plans

8.3.3.1 Definition. A structural steel plan is a plan that shows the primary and secondary structural steel such as beams, girders, diagonal bracing, columns, bend plates, etc.

8.3.3.2 Requirements.

a. The scale should preferably be no larger than that used on the architectural plan. The scale(s) shall be noted and a scale indicator(s) placed on the drawing.

b. All structural members shall be designated as to size, group, and weight and shown by a single, thick solid line on the center line of beam shapes and on the backs of

channels and angles. All other components shall be shown as dashed (hidden) or phantom lines.

c. Plan views shall be drawn at the elevation of the top of the main framing steel and the elevations shall be noted, below the plan view, in feet and inches to a reference datum.

d. When a structural member is at a different elevation than the main framing steel, the "difference in elevation" shall be noted in parentheses following the size, group, and weight designation of that member; e.g., 6B12(-2").

e. When structural members, except channels and angles, are shown on their minor axes, the elevation noted shall be to the center line of such members.

f. When a structural member is sloping and will not be shown in subsequent sections or details, that member shall be noted, following the size, group, and weight designation, as "SLOPE," in parentheses; e.g., 6B12 (SLOPE). The elevation of a sloping member shall be noted in feet and inches from the elevation of the main framing steel.

g. Bent plates, which upon fabrication become an integral part of a beam, shall be indicated by the letter "P," followed by an identification number; e.g., P-1. The bent-plate designation shall become a part of the beam designation; e.g., 6B12 and P1. A bent-plate schedule and appropriate details shall be shown on the drawing.

h. When a grid system is used, a column schedule or call-outs on the drawing face shall be incorporated in the drawing(s). A column schedule shall show column mark, column length, column splices, baseplate size, and the elevation of top of baseplate in feet and inches to the reference datum line. Also included on the column schedule will be typical baseplate details.

8.3.4 Framing Sections or Elevations

8.3.4.1 Definition. Framing sections or elevations show all primary and secondary structural members as applicable, including girts, struts, bracing, sag rods, etc. (Ref. Fig. 47)

8.3.4.2 Requirements.

a. The scale should preferably be the same as the scale used on the plan.

b. Exterior covering shall not be shown.

c. Members or parts of members embedded in concrete shall be shown by dashed (hidden) lines, with the concrete outline shown by a phantom line.

d. Main framing structural steel, columns, and beams shall be shown in their entirety. No attempt shall be made to show flange or web thickness to scale, but it is required to indicate them to show column or beam placement.

e. Girts, bent plates, sag rods, bracing, etc. need not be shown in their entirety. It is sufficient to indicate each girt run by a dashed (hidden) line with only a short section of the actual girt imposed thereon to show correct placement. Each girt indication between columns will bear a size, group, and weight designation.

f. Bracing or sag rods using rolled shapes shall be shown the same as girts except when the placement orientation is of no importance, then a dashed (hidden) line with the size, group, and weight designation will suffice.

g. Bracing or sag rods using round bars shall be shown by a dashed (hidden) line only, with appropriate designation as to diameter of the bars and to miscellaneous attachments such as turnbuckles, etc.

h. Bent plates shall be indicated by showing only a short section of plate at each beam level where the bent plate is attached. The beam to which the bent plate is attached shall be identified.

i. Members which have been shown on plan views shall be identified by size and group designation only; no weights shall be repeated.

j. Members previously shown in plan and to which a bent plate is attached shall be identified by size and group designation followed by the proper bent-plate designation; e.g., 12 and P1.

k. Horizontal members, such as girts, struts, etc., shall be dimensioned vertically. Dimensions shall be from top of flange to top of flange for beam and channel shapes on their major axes, from back to back on angles and channels on their minor axes, and from center line to center line for beam shapes on their minor axes and for structural tee shapes. All vertical dimensions shall be tied to an established roof or floor elevation or to the reference datum line. (Ref. Fig. 38)

l. Horizontal dimensions shall be used to show girt or building lines, door openings, window openings, etc. Column grid spacing should not be dimensioned on framing sections or elevations; however, all horizontal dimensions shall be tied to an established column grid line.

8.3.5 Connections and Details

8.3.5.1 Definition. Connections and details supplement the plans and elevations and provide information complete enough so that shop drawings can be prepared without resorting to information from engineering discipline drawings.

8.3.5.2 Requirements.

a. Identify all members by their size, group, and weight.

b. The actual dimensions of the member shall be used rather than the nominal dimension.

c. Standard drill and punch gages for columns and beams and the usual gages for angles as shown in AISC M013 (Detailing for Steel Construction) shall be observed.

d. When detailing welded connections, the size, type, and extent of the weld shall be shown. Reference to the specification shall be made if applicable.

e. When standard beam connections as shown in AISC M013 are used, they shall be called out by type and number and their dimensions omitted.

f. When detailing angles with bolted or riveted connections, the working point shall be the usual gage line. When detailing angles with welded connections, the working point shall be the major or the X-X axis.

8.4 SYMBOLS FOR STRUCTURAL DRAWINGS

8.4.1 Symbols for Rolled Shapes

When designing rolled steel shapes on drawings, only standard nomenclature and abbreviations shall be used as shown in the Steel Construction Manual of the American Institute of Steel Construction.

9.0 MECHANICAL DRAWINGS

9.1 DEFINITION

A mechanical drawing graphically displays piping to convey solids, liquids, or gases, the construction details for mechanical devices and air-conditioning installations, and the construction details for tanks, fire protection systems, etc. These drawings establish the requirements for construction and/or planning of interrelated elements of the facility design including pertinent services, equipment, and other features required to ensure the performance of the mechanical

equipment. These drawings incorporate dimensions, symbols, reference to codes, conventions, schedules, diagrams, etc., to describe the size and routing of pipes, the kind of material to be used, equipment criteria, duct sizes and shapes, amount of flow and the temperature of material in pipes and ducts, valve types and location, floor and wall penetrations, tank construction, and other facets of mechanical design.

9.2 FLOW DIAGRAMS

9.2.1 Definition

Flow diagrams show piping or duct circuits, functional components, and equipment involved in the system. The purpose of a flow diagram is to convey design information such as input conditions, the condition changes within the system, and the output(s). They also serve as a basis for detail design drawings, maintenance, and operator training, and as an aid in the construction of the facility.

A flow diagram for an air-conditioning system, for example, may include the following: the quantity of air handled, usually noted in cubic feet per minute including fresh air and recirculated air; the entering and leaving wet and dry bulb temperatures; the condition of the air entering the treating equipment; the heat added or rejected; the source or disposal of the heat; the quantity of steam, chilled or hot water supplied; the temperature of water entering and leaving the heat exchanger; the refrigeration machine condenser water supply; the cooling tower water conditions; and design conditions for air, the tower blowdown, and the boiler.

9.2.2 Requirements

a. Where feasible, the flow diagram shall include the instrumentation. In those instances when it is desirable to prepare a separate instrumentation diagram, the flow diagram shall show only such instrumentation required for ease of orientation between the drawings. These drawings shall be cross-references.

NOTE

When a flow diagram and an instrument diagram are both required, the instrumentation may be indicated on the flow diagram by a 1/2-inch diameter circle with the instrument identification letter(s). A legend shall be included on the drawing defining the symbols and identifications used.

b. The piping and instrument control lines shall be shown in single-line, diagrammatic form, using symbols to depict all components used in the system including valves, pumps, jets, coils, and instrumentation. (Ref. Fig. 16, 17, & 18)

c. Only one specific system shall be shown on a given drawing or flow diagram. Purge lines and other interface lines shall be shown on the prime system only to the first interface value.

d. All test stand piping schematics shall have a location grid key block. Key components shall be assigned references to help locate them on the stands.

e. Where applicable, each component shall be identified on the drawing by system locator number. These numbers are assigned by CEF in accordance with SSTD 8070-0006-CONFIG.

f. All building, structure, or specific area outlines shall be shown with a phantom line approximately 1/16" thick.

g. Equipment shall be shown in simple outline form. Piping connections shall be indicated in approximately the correct location such as the top, bottom, or side of a vessel. If the equipment (vessels, pumps, agitators, etc.) is located within a space and the instrumentation is located elsewhere, it shall be indicated on the flow diagram.

h. The flow lines shall bear the line number, if applicable, the pipe size, pipe code, or reference to the specification. If all lines are covered by one code or specification, reference to the specification may be included in the general notes and omitted at the line location.

i. Valve symbols, code, or specification notes shall indicate whether a valve is remotely or manually operated; whether the actuation is by air, electricity, or other means; and whether valve is normally open or closed.

j. Whenever practical, lines carrying liquid shall have direction of flow indicated by arrowheads at all junctions.

k. Distinction between new and existing facilities shall be made by indicating all new work with thick lines and all existing facilities in phantom or light lines.

l. Reference Drawing Block includes the following.

1. Each drawing referenced on the field of piping schematic shall be shown in the reference drawing block located in the upper right-hand corner.

2. Each schematic shall reference the advanced schematic block diagram for the same system function, if one has been or is being made.

3. The first drawing in the reference drawing block shall be the legend sheet.

4. The second drawing referenced shall be the Site Distribution Plan. The numbers are different for each system as follows:

Oxygen - Site Distr. Plan - Index Sh.	11B00-R000
Hydrogen - Site Distr. Plan - Index Sh.	11C00-R000
RP-1 - Site Distr. Plan - Index Sh.	11D00-R000
Nitrogen - Site Distr. Plan - Index Sh.	11F00-R000
Helium - Site Distr. Plan - Index Sh.	11G00-R000
HP Air - Site Distr. Plan - Index Sh.	11H00-R000
HPIW - Site Distr. Plan - Index Sh.	11J00-R000

9.2.3 Instrument Diagrams

The instrument diagram describes the measured flow variables such as pressure drop, flow, temperature(s), etc. Instrument diagrams also identify the instruments to be used in the measurements and show in schematic form the equipment and lines which are controlled, measured, or operated by instruments.

9.2.3.1 Delineation.

a. Instrument piping, tubing, and electrical lines shall be shown in single-line diagrammatic form and identified with name, size, and code or specification. Instrument equipment, such as recorders, controllers, valves, pumps, venturi, rotameters, microphones, etc. shall be shown using symbols. The instruments shall be identified by name, ranges, etc. This data may be included in a schedule. Instruments may be identified using letters.

b. The instrument diagram shall show, in schematic form, all equipment and lines which are controlled, measured, or operated by instruments. The equipment and lines shall be identified by name or line number with size and specification omitted. The identification shall be obtained from the flow diagram.

c. Panel-mounted instruments shall be shown near the top of the drawing arranged in a horizontal line. Transmitters, motors, and other instruments are shown in a space below the panel-mounted instruments. The lower part of the drawing shall show the vessels, pumps, columns, tanks, and other equipment being served by the instruments.

d. Whenever an instrument diagram is prepared to graphically display additions or modifications to existing facilities, all new instrumentation shall be shown by thick lines, while existing equipment, instrumentation, and piping shall be shown in light

lines. A legend shall be included on the drawing defining the symbols and line designations used.

9.3 PIPING DRAWINGS

9.3.1 Definition

A piping drawing graphically displays the components required to convey liquids, solids, and gases. Included are items such as the supply and distribution of domestic or industrial water and systems for fire protection, dispensing of industrial gases, drainage, chemicals, fuel supply to an engine, etc.

Piping drawings, or a set of piping drawings, graphically display by incorporating dimensions, symbols, codes, conventions, schedules, diagrams, etc., the kind, size, and routing of pipe, hose and tubing, the associated vessels and equipment, and other facets of mechanical design.

9.3.2 Requirements

The following rules shall be followed when graphically displaying piping drawings.

a. Exposed pipe shall be shown as a single, thick line; and hidden or buried pipe shall be shown as a thick dashed (hidden) line; however, in order to delineate clearances and special conditions, pipe may be shown using a double line. When double-line piping details are drawn to delineate clearances, valves and fittings may be shown symbolically or in outline form but shall be to scale.

b. When new and existing pipe and/or equipment is shown on the same drawing, existing pipe and equipment shall be shown using a light line. (Ref. Fig. 39)

c. Pipe shall be identified as to size, schedule, material, and fabrication processes. This information, if included in a specification (with the exception of the size), shall not be repeated on the drawing.

d. Valves and fittings shall be graphically displayed symbolically, using proper fitting symbols (Ref. Fig. 16, 17, & 18). Valve stems, hand wheels, etc., even though shown symbolically, shall be drawn to scale where a clearance problem may exist or where removal or operation may be critical.

e. The scale used for piping drawings should fit requirements.

f. On piping systems, where the location of the pipe runs is not critical from a design standpoint and there is no possibility of interferences with other components, the dimensional location of the pipe, valves, and fittings need not be shown. The pipe shall be delineated in the desired location and sufficient surroundings are shown for

orientation. When dimensions of components other than piping are given, such as door sizes, column spacing, room sizes, beams etc., they shall be marked reference. See paragraph 5.11.3.5 for reference dimension application.

g. When pipe locations are given, they shall be dimensioned according to the following (specify if dimensions are from finished or unfinished surfaces).

1. Pipe mains and branches shall be dimensionally located from the facilities structures such as column lines, walls, ceiling equipment, supports, etc., or from recognized bench marks to the centerline of the pipe, except as noted herein.

2. Pipe(s) supported from a wall shall be dimensioned from the wall to the back of the pipe.

3. Pipe(s) shown in elevation or section shall have their centerline elevations given above or below grade to a reference datum plane.

4. Valves shall be dimensioned to the centerline.

5. Dimensions shall not be repeated. If dimensions are repeated for clarity, they shall be marked "REF."

h. When draining of horizontal lines is required or drip stations are called for, the slope in lines shall be called out by an arrow placed adjacent to the applicable line. The slope shall be indicated in inches per foot or the elevation given at both ends of the slope.

i. When more than one system or service is delineated on the drawing, line designations shall be used above the line. See paragraph 9.6.2 for line designations.

j. Isometric views may be utilized for piping arrangements and/or details as required for clarity. Isometric drawings shall be drawn 30° to horizontal. (Ref. Fig. 40)

9.4 HEATING, VENTILATING, AIR-CONDITIONING

9.4.1 Definition

Heating, ventilating, and air-conditioning drawings graphically display the components required to supply or remove air by natural or mechanical means. Such air may or may not be conditioned. The delineation for these drawings shall incorporate dimensions, symbols, codes, conventions, schedule, diagrams, etc. to describe the air ducts, blowers, filters, heating or cooling coils, roof exhausters, grilles, dampers, air-conditioning units, pumps, controls, etc.

9.4.2 Requirements

The following rules shall apply when detailing these drawings.

a. Drawings shall be prepared showing routing and location of ducts, grilles, and required ventilation, exhaust, and/or air-conditioning equipment.

b. Duct layouts shall include grille sizes, CFM, splitters, outlet control dampers, elbows, access doors, branches, volume control dampers, louver openings, booster heating equipment, and miscellaneous operating control instrument element locations.

c. When duct sizes are given, the first dimension is the side shown; for example, 20" x 12". The 20" dimension is the width and the 12" dimension is the depth. (Ref. Fig. 41)

d. Material for ducts, gage of metal, type and spacing of joints and reinforcements, type and spacing of hangers, angle of change in size transitions, and cross bracing shall be given on the drawing, if not covered in the specification.

e. Direction of flow shall be indicated by an arrow.

f. All parts such as coils, fans, dampers, housings, compressors, and miscellaneous items shall be called out on the drawing. A schedule may be employed for this purpose. A schedule lists the type, size, capacity, speed, and other pertinent information in tabular form.

g. Isometric views may be used to clarify piping routing or connections. Isometric views of duct work may also be used for clarification.

h. Automatic control diagrams for ventilation, heating, and air-conditioning systems shall show.

1. all controllers, thermocouples, valve and damper operators, relays, and accessories necessary to illustrate the functions and sequence of operation of all principal components in the system;

2. the set point and throttling range of all controllers;

3. the normally open or closed position of all valves and dampers; and

4. the sequence of operation of the system through a complete winter-summer cycle, including the OFF condition.

9.5 FACILITIES EQUIPMENT DRAWINGS

Facilities equipment drawings delineate installation and/or construction details for special equipment such as tanks, towers, condensers, etc. Three general types of drawings are included in this category.

9.5.1 Facilities Equipment Construction Drawing

9.5.1.1 Definition. A facilities equipment construction drawing shows the parts and the assembled relationship of the parts in sufficient detail to construct the tank, condenser, etc.

9.5.1.2 Requirements. Facilities equipment construction drawings shall contain sufficient external and sectional views to show the relationship between each subassembly and part comprising the assembly of the equipment. Detailed information shall be given for each part. Generally, subassemblies and parts shall be called out in the field of the drawing by an identifying part number cross-referenced to the identifying number in a table, parts list, or list of material. Reference shall be to pertinent installation drawings. For detailed drafting practices pertaining to dimensioning, sectioning, etc., see Section 5.

9.5.2 Facilities Equipment Modification Drawing

9.5.2.1 Definition. A modification drawing delineates the changes required to be made to equipment such as a vessel, chiller, boiler, condenser, etc., to adapt it to a specific installation. (See section 5.4.)

9.5.2.2 Requirements. An equipment modification drawing shall delineate the changes required with sufficient detail to clearly orient and define the work to be performed. When the modifications are minor, they may be delineated on the equipment installation drawing.

9.5.3 Facilities Equipment Installation Drawings

9.5.3.1 Definition. An installation drawing shows general configuration, attaching hardware, piping, and information to locate, position, and mount equipment relative to fixed points.

9.5.3.2 Requirements

a. Equipment installation drawings shall show the equipment in simplified outline form drawn to scale. The equipment shall be located from column lines, walls, ceilings, or other fixed points. Clear space required for maintenance and/or operation, such as

space for retubing, changing filers, future additions, etc., shall be indicated by phantom lines. Special openings, etc. required for removal and/or bringing the equipment into the space shall be shown.

b. Sufficient piping, electrical, and other connecting or pertinent components shall be shown and reference made to the applicable drawing.

c. The equipment shall be identified as to type, capacity, horsepower, coil data, etc. For an example of a typical schedule Ref. Fig. 24.

d. A separate equipment installation drawing shall not be prepared if it is feasible to include the information on the drawing with the interconnected pipes, ducts, conveyers, etc.

9.6 SYMBOLS FOR MECHANICAL DRAWINGS

9.6.1 Graphic Symbols for Pipe Fittings, Valves, and Piping

These symbols may be used for all systems using any kind of medium gas, steam, or fluid. Since symbolic representation does not usually involve exact or scale layout or the actual run or leads of piping, the same symbol may be used for all projections of the system, except where specific symbols for the various views are included in this standard. Symbols shall be in accordance with drawing 54000-P001 SHEETs 1, 2, and 3. (Ref. Fig. 16, 17, & 18)

9.6.2 Piping and Air-Conditioning Line Designations

The following are the most commonly used line designations, but additional designations may be employed as required. All line designations shall be defined in a legend on the drawing.

Acid - Hydrofluoric	HF
- Nitric	HN03
- Phosphoric	H3PO4
- Sulfuric	H2SO4
Air - Compressed (PSIG)	CA-90#
- High pressure (PSIG)	HPA-1500#
- Instrument (PSIG)	IA-30#
Boiler Blow Down	BD
Condensate	CD
Drains	(See Sewers.)
Ethylene Glycol	EG
Fire	(See Water Sprinkler.)
Fuel oil	FO
- Return	FOR

- Vent	FOV
Gas - Acetylene	C2H2
- Argon	A
- Carbon dioxide	CO2
- Freon (number type)	Freon-12
- Helium	HE
- Hydrogen (gas)	GH
- Hydrogen (liquid)	LH
- Methane	CH4
- Nitrogen (gas)	GN
- Nitrogen (liquid)	LN
- Oxygen (gas)	GOX
- Oxygen (liquid)	LOX
- Propane	PR
- Natural	NG
Refrigerant - Liquid	RL
- Gas	RG
Sewers - Acid waste	AW
- Sanitary	SS
- Storm	SD
Steam - High-pressure (125+ lbs.)	HPS 250#
- Low-pressure (under 30 lbs.)	LPS 15#
Vacuum	VAC
Vent	V
Vent stack through roof	VTR
Water - Chilled	CHW
- Cold domestic	CW
- Condenser	COW
- Distilled	DW
- De-ionized	DI
- Domestic/potable	PW
- Heating	HW
- High-pressure industrial	HPIW
- Hot domestic	HW
- Industrial	IW
- Hot sanitary	HSW
- Cold sanitary	CSW
- Sprinkler/fire protection	F

9.6.3 Welding Symbols

9.6.3.1 Definition. Welding symbols denote the types of joints and welds. In addition, if required, the symbol may make reference to the process, specification, inspection method, etc.

9.6.3.2 Symbols. The symbols denoting types of joints and welds to be used on construction drawings have been standardized by the American Welding Society and accepted for use by all American professional engineering societies. AWS A2.4 is the standard which defines guidelines for the use of welding symbols and, as such, is a part of this SSTD. (Ref: Fig. 42)

9.6.3.3 Elements of a Welding Symbol. This standard makes a distinction between the terms "weld symbol" and "welding symbol." The "weld symbol" is the ideograph used to indicate the desired type of weld. They are used instead of a written note to give the welding process, preparation of the part to be welded, size, length, and location of weld, where welding is to be done (in shop or field), and finish to be given the weld. The assembled "welding symbol" consists of these elements, as necessary:

- Referenced line;
- Arrow;
- Basic weld symbols;
- Dimensions and other data;
- Supplementary symbols;
- Finish symbols;
- Tail; and
- Specification, process, or other references.

9.6.3.4 Use of the Arrow in the Welding Symbol. Standard symbols are related to the part to be welded by means of an arrow. Arrangement of the symbols with respect to their location is significant in describing the weld required, with respect to which side of the work is to be welded.

The elements of the welding symbol shall have standard locations with respect to each other.

10.0 ELECTRICAL DRAWINGS

10.1 SCOPE

This standard provides a basis for:

- Showing the general physical location and arrangement of the required wiring system;

- Identifying the physical requirements for various types of materials needed to provide the electrical installation in building.

In some instances, symbols may indicate the function or electrical characteristics of the system; however, that is not their primary purpose. Such functions or characteristics are shown by the use of the graphic symbols for electrical diagrams, as specified in ANSI Y32.2, IEEE Std. 315 and 315A (Graphic Symbols for Electrical and Electronic Diagrams).

The required installation is shown on the drawing by the use of the various applicable device (typical) and equipment symbols, together with interconnecting circuit or feeder run lines, supplemented with necessary notations.

In general, basic symbols have been included in the symbol schedule. In some instances, the use of numbers or letters of the alphabet, drawn in or at the side of the basic symbol may be required to identify a specific application of the symbol for a particular type or use of outlet. In some instances, the physical or electrical size of the item identified by the symbol will be noted to one side of it.

10.2 REFERENCED DOCUMENTS

ANSI Y32.2, IEEE Std. 315 and 315A (Graphic Symbols for Electrical and Electronics Diagrams).

10.3 DEFINITIONS AND GENERAL REQUIREMENTS

10.3.1 Drafting Practices Applicable to Graphic Symbols

10.3.1.1 Electrical Outlets. Electrical outlets shall be drawn to an appropriate scale or figure dimensions noted. They shall be made on drawing sheets separate from the architectural or structural drawings or the drawing sheets for mechanical or other facilities.

10.3.1.2 Clearness of Drawings. Drawing clarity is often impaired when different electrical systems to be installed in the same building area are laid out on the same drawing sheet, or when an extremely small drawing scale is used. Under these circumstances, for clarity, the different systems should be laid out on separate drawing sheets.

10.3.1.3 Outlet and Equipment Locations. Outlet and equipment locations with respect to the building should be shown as accurately as possible on the electrical drawing sheets to reduce reference to architectural drawings. Where extremely accurate final locations of outlets and equipment are required, figure dimensions shall be noted on the drawings. Circuit and feeder run lines should be drawn to show their installed location in relation to the building insofar as it is practical to do so. The number and size of conductors in the runs shall be identified by notation when the circuit run symbol does not identify them.

10.3.1.4 Branch, Control and Signal System Circuits. All branch circuits, control circuits and signal system circuits shall be laid out in complete detail on the electrical drawings, including identification of the number, size and type of all conductors.

10.3.1.5 Electrical Wiring. If wiring installation will be required under the electrical wiring contract, the electrical wiring necessary for mechanical facilities (such as heating, ventilating, air-conditioning, and processing equipment) shall be included in as much detail as possible in the electrical layout. This procedure will eliminate references to mechanical drawings and will indicate responsibility for the installation of the work.

10.3.1.6 Complete Electrical Layout. A complete electrical layout shall include at least the following on one or more drawings: (Ref. Fig. 43)

a. Floor plan layout, to scale, of all outlet and equipment locations and wiring runs;

b. A complete schedule of all of the symbols used, with appropriate description of the requirements;

c. Panelboard schedule showing the circuit breaker size, panel capacity, device being supplied, voltage, number of phases and spares;

d. Riser diagram showing the physical relationship of the service, feeder and major power runs, unit substations, isolated power transformers, switchboards, panelboards, pull boxes, terminal cabinets and other systems and equipment;

e. Where necessary for clarity, a single-line diagram showing the electrical relationship of the component items and sections of the wiring distribution system;

f. Where necessary to provide adequate information, elevations, sections, and details of equipment, special installations, and special lighting fixtures and devices;

g. Sections of the building or elevation of the structure showing floor-to-floor, outlet, and equipment heights, relation to the established grade, general type of building construction, etc., and, where practicable, suspended ceiling heights indicated by figure dimensions on either the practical floor plan layout drawings or on the electrical building section or elevation drawings;

h. Where necessary, to provide adequate information, plot plan to scale showing the relation of the building or structure to other buildings or structures, service poles, service manholes, exterior area lighting, exterior wiring runs, etc.;

i. Area drawings showing the complete system for exterior wiring systems of street and highway lighting;

j. Any changes made to the electrical layout after completion of the original drawings, clearly indicated on the drawings and identified by a revision symbol.

10.3.2 Explanation Supplementing the Schedule of Symbols

10.3.2.1 General.

a. Type of Wiring Method or Material Requirements. When the ground wiring method and material requirements for the entire installation are described in the specifications or specification notations on drawings, no special notations need be made in relation to symbols on the drawing layout. For example, if an entire installation is required by the specifications and general reference on the drawings to be explosion proof, the outlet symbols do not need to have special identification.

NOTE

When certain different wiring methods on special materials will be required in different areas of the building or for certain sections of the wiring system on certain outlets, such requirements should be clearly identified on the drawing layout by special identification of outlet symbols rather than only by reference in the specifications.

b. Special Identification of Outlets. Weatherproof, vaportight, watertight, raintight, dusttight, explosionproof, ungrounded, recessed, or other outlets requiring special identification may be indicated by upper-case letter abbreviations at the standard outlet symbol; for example:

Weatherproof	WP
Vaportight	VT
Watertight	WT
Raintight	RT
Dusttight	DT
Explosionproof	EP
Grounded	G
Recessed	R
Ungrounded	UNG

NOTE

The grade, rating and function of wiring devices used at special outlets should be indicated by abbreviated notation at the outlet location. When the standard special-purpose outlet symbol denotes the location of the special equipment or outlets or points of connection for such equipment, the specific usage will be identified by a subscript numeral or letter alongside the

symbol. The usage indicated by different subscripts will be noted on the drawing schedule of symbols.

10.3.2.2 Lighting Outlets.

a. Indication of type of installations. Variations, such as a recessed lighting fixture, should be indicated if they need a special type of outlet box, outlet supporting means, wiring system arrangement, outlet connection, or other items, such as plaster rings or roughing - in cans. For a recessed fixture installation, the adopted standard is a capital letter "R" drawn within the outlet symbol.

b. Fixture Identification. Lighting fixtures are identified as to type and size by placing an upper-case letter by each outlet symbol and by adding a notation of the lamp size. When two or more lamps per fixture unit are required, the number of lamps per unit should also be indicated. A description of the fixture identified by the letter will be given in the drawing schedule of symbols, or in the separate fixture schedule on the drawing, or in the electrical specifications. When lamp and fixture identifications cause drawing congestion, a schedule shall be used to clearly identify the lamps and figures required for each location.

c. Switching of Outlets. When different lighting outlets within a given local area are to be controlled by separately located wall switches, the related switching will be indicated by the use of lower-case letters at the lighting and switch outlet locations.

10.3.2.3 Power Equipment.

a. Rotating Equipment. At motor and generator locations, the horsepower of each motor or the capacity of each generator should be noted on the drawing adjacent to the symbol. When motors and generators of more than one type or system characteristic (voltage and phase) are required on a given installation, the specific types and system characteristics should be noted at the outlet symbol.

b. Switchboards, Power Control Centers, Unit Substations, and Transformer Vaults. The exact location of such equipment on the electrical layout floor plan drawing should be shown.

A detailed layout including plan, elevation and sectional views should be shown when needed for clarity in showing the relationship of such equipment in the building structure or other sections of the electrical system.

A single-line diagram, using standard graphic symbols for electrical diagrams, as specified in ANSI Y32.2-5 (IEEE Std. 315 and 315A), should be included to show

the electrical relationship of the components of the equipment to each other and to the other sections of the electrical system.

APPENDIX A

ACRONYMS AND ABBREVIATIONS

AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
CADD	Computer Aided Design and Drafting
CEF	Central Engineering Files
COC	Certificate of Completion (form SSC-625)
COSD	Center Operations and Support Directorate
DWG	Drawing
ECR	Engineering Change Request (form SSC-650)
EMI	Engineering Modification Instruction (forms SSC-151 series)
EO	Engineering Order (form SSC-721)
FCR	Field Change Request (form SSC-61)
FED	Facilities Engineering Division (NASA CO)
FOSC	Facility Operating Services Contractor
HVAC	Heating, Ventilating and Air Conditioning
IEEE	Institute of Electrical and Electronics Engineers
MIL	Military
NASA	National Aeronautics and Space Administration
NPD	NASA Policy Directive
OI	Organizational Instruction
PDS	Project Data Sheet (form SSC-702)
PL	Parts List
PTD	Propulsion Test Directorate
SCD	Specification Control Drawing
SORD	Sitewide Operation and Repair Drawing
SSC	Stennis Space Center
SSLP	SSC System Level Procedure
SSTD	Stennis (Space Center) Technical Standard
STD	Standard
SWR	Stennis Work Request (form SSC-704)
TTSC	Test and Technical Services Contractor

TITLE

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

	SIGNATURES	DATE
DRAWN		
CHECKED		
ENGINEER		
ISSUED		
SUBMITTED		
NASA SAFETY		
APPROVED		DATE
USED ON		

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION — JOHN C. STENNIS SPACE CENTER, BSC, MS 39529-6000

CONTRACTOR'S NAME

FIG. 1
VICINITY PLAN, FEE AREA
DRAWING INDEX

SIZE: FI | DWG NO. | REV.

AUTHORITY | SHEET

CADD CONTROLLED DRAWING

CADD P/N:

REF NO

DRAWING INDEX

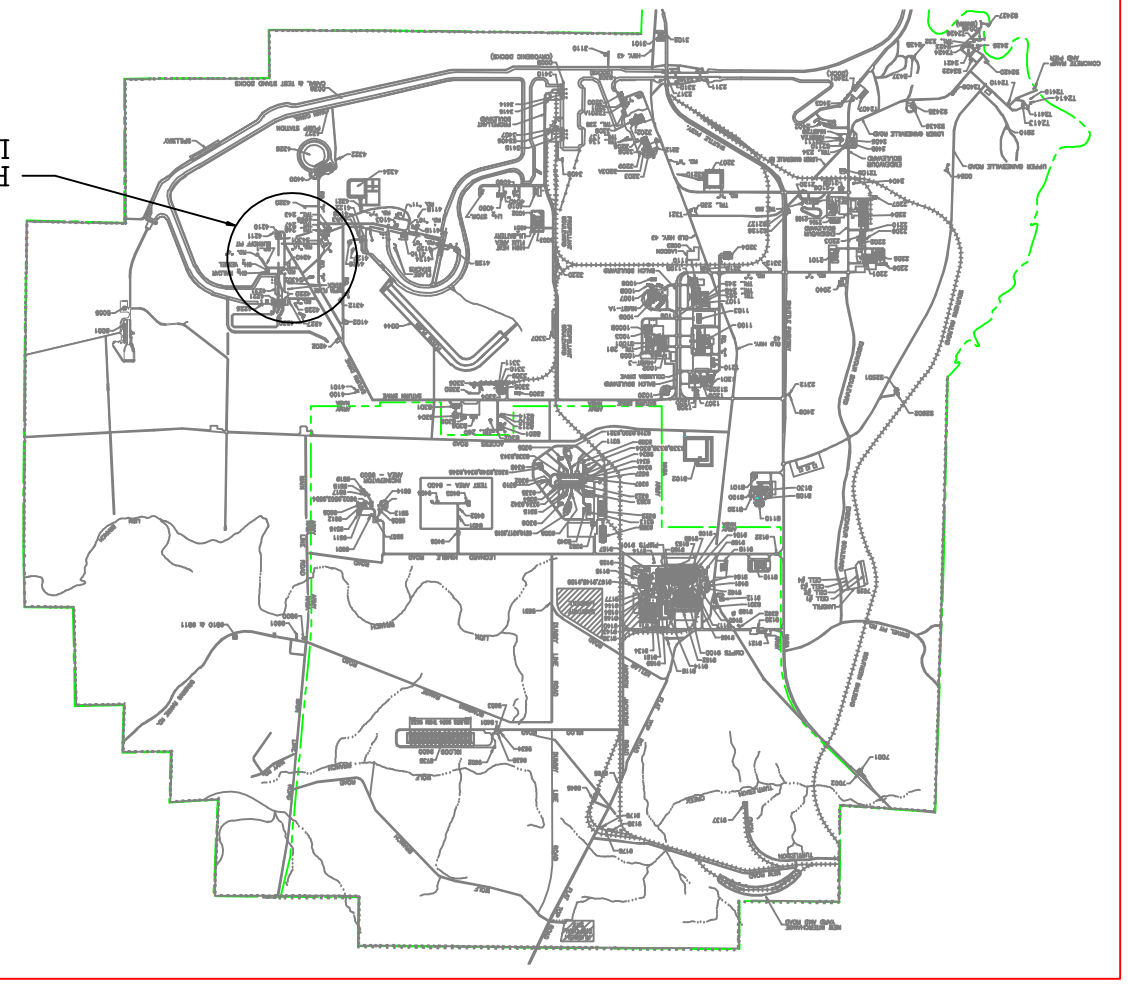
DWG. NO.	DOCUMENT DESCRIPTION
V1	VICINITY PLAN, FEE AREA, DRAWING INDEX

FEE AREA
JOHN C. STENNIS SPACE CENTER

SCALE IN FEET
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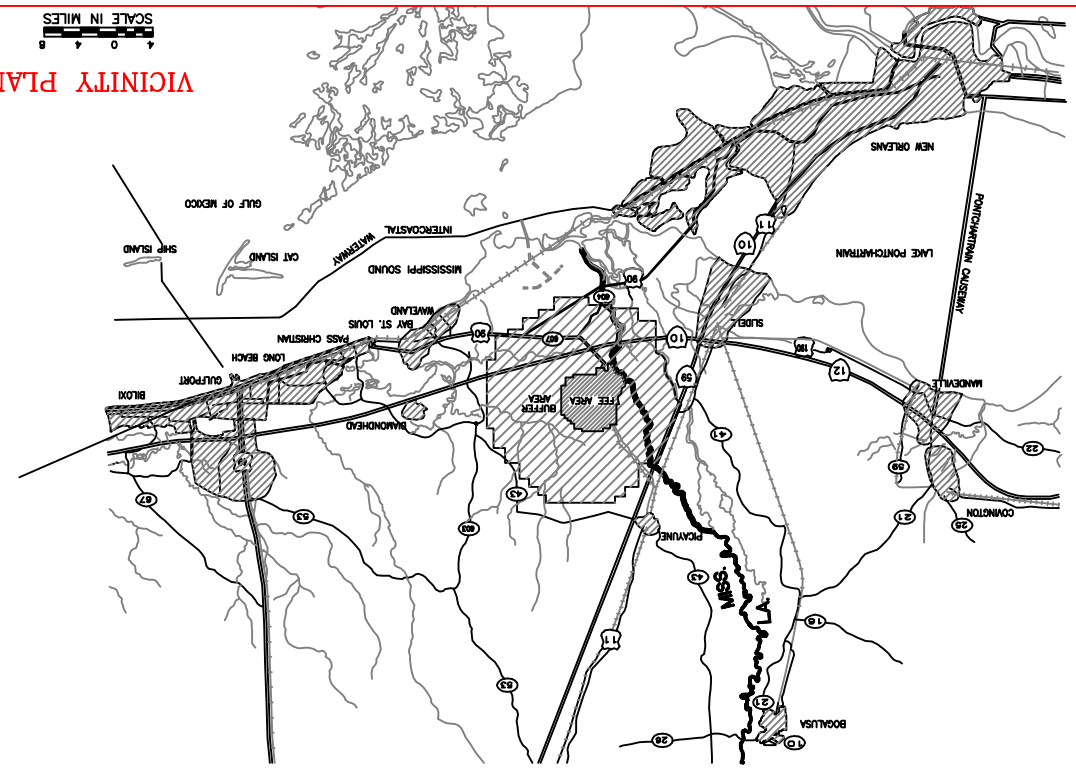
PROJECT LOCATION



VICINITY PLAN

SCALE IN MILES
4 0 4 8

N



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

ENGINEERING MODIFICATION INSTRUCTION PACKAGE INDEX

PREPARED BY: CONTRACTOR'S NAME (1) | _____ PARTIAL _____ FINAL (3) RELEASE | ORIGINAL ISSUED CEF (4) | AUTHORITY (5)

TITLE: (2)

The following interim documentation is required for the subject · CR.

SIZE	C/B	DOCUMENT NO.	NEW	REV.	SIZE	C/B	DOCUMENT NO.	NEW	REV.
		(6)							

The following baseline documentation is required for the subject · CR.

DWG NO.	REV.	EO	NO. OF SHTS.	DWG NO.	REV.	EO	NO. OF SHTS.	SPEC. NO.	CHG.	NO. OF SHTS.
(7)								(8)		

The following reference documentation is required for the subject · CR.

DOCUMENT IDENTIFICATION	DOCUMENT IDENTIFICATION	DOCUMENT IDENTIFICATION
(9)		

COMMENTS (10)

REVISIONS

NO.	DESCRIPTION	APPROVALS	ISSUED CEF
		(14)	

SUBMITTED: (11) DATE:

NASA SAFETY: (12) DATE:

APPROVED: (13) DATE:

SSC-151A (01/93) (PREVIOUS EDITION OBSOLETE)

FIG. 2 – Engineering Modification Instruction Package Index

(#) = SEE EMI PREPARATION SECT. 5.4.1C OF (STD 8070.0002)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

ENGINEERING MODIFICATION INSTRUCTION

PREPARED BY CONTRACTOR'S NAME	DRAWN:	CHECKED:	ENGINEER:	EMI _____ DOC. NO. _____
NOTES		SUBMITTED:	NASA SAFETY:	APPROVAL:

REVISIONS		
NO.	DESCRIPTION	APPROVALS

1. Task Description :

2. ☐ (Note) Checked items only are applicable.

   ☐ A. AISC tolerances shall apply for structural steel sections and plates.
   ☐ B. Fractions @ 1/8"
   ☐ C. Angles @ 1 degree
   ☐ D. Shop tolerances per SSC 66-505

3. ☐ Remove burrs, weld scale, weld spatter, and break sharp edges.

4. ☐ Paint new and marred surfaces of carbon steel per SSC 80-502 with one coat primer and two finish color coats. Do not paint galvanized, aluminum, copper, stainless steel and other nonferrous metals or prefinished surfaces unless specifically directed .

5. ☐ Welding and inspection:

   ☐ A. Weld _____ Per _____ ,

   Inspection class _____ Per SSC 34-004 .

   ☐ B. Weld _____ Per SSC 34- _____ ,

   Inspection class _____ Per SSC 34-004 .

6. ☐ Proof test:

   ☐ A. Hydrostatic _____ @ _____ PSIG for _____ .
   ☐ B. Pneumatic _____ @ _____ PSIG for _____ .

7. ☐ Leak test:

   ☐ A. _____ @ _____ PSIG for _____ .

8. ☐ Remove material to be dispositioned as directed below or delivered to property disposal and redistribution at the warehouse along with completed form SSC 55 (reference M-22.3, turn in or scrap, salvage and excess property).

9. ☐ SSC 47-001, design standard for piping and tubing systems as noted below shall be used only as a guide when specific conditions are not noted elsewhere in this EMI .

   ☐ A. SSC 47- _____ For _____ .
   ☐ B. SSC 47- _____ For _____ .

SSC-151-1 (01/93) (PREVIOUS EDITIONS OBSOLETE)

FIG. 3 - EMI IMPLEMENTATION DOCUMENT (SHT. 1)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

ENGINEERING MODIFICATION INSTRUCTION

PREPARED BY CONTRACTOR'S NAME	DRAWN:	CHECKED:	ENGINEER:	EMI _____ DOC. NO. _____
NOTES		SUBMITTED:	NASA SAFETY:	APPROVAL:

REVISIONS

NO.	DESCRIPTION	APPROVALS

10. ☐ Locator tags to be fabricated per SSC 97-005 and installed as applicable .

11. ☐ Functional test requirement:

12. ☐ Preinstallation cleanliness requirement:

- ☐ A. All items (except RV's) added by this CR will be cleaned to meet the level of contamination(s) as specified in 12.B.
- ☐ B. The component(s) cleanliness will be verified as meeting the requirements of SSC 79-001 for applications to facility transfer systems cleaning requirements.
  - ☐ (1) Level _____ For _____ .
  - ☐ (2) Level _____ For _____ .
- ☐ C. Verification shall be by:
  - ☐ (1) Visual inspection .
  - ☐ (2) Dewpoint temperature of -65 degrees F or lower.
  - ☐ (3) Gas sample to meet the requirements of MSFC-PROC-404 for particulate contamination dewpoint and hydrocarbon content .
  - ☐ (4) Solvent flush to meet applicable requirements of particulate and nonvolatile residue contamination .

13. ☐ Installation cleanliness requirements:

- ☐ A. Maintain system cleanliness during installation.
- ☐ B. After completion of work, the system cleanliness will be verified as meeting the requirements of SSC TP0144 for application to facility transfer system cleaning requirements.
  - ☐ (1) Level _____ For _____ .
  - ☐ (2) Level _____ For _____ .
- ☐ C. Verification shall be by:
  - ☐ (1) Visual inspection .
  - ☐ (2) Dewpoint temperature of -40 degrees F or lower.
  - ☐ (3) Gas sample to meet the requirements of MSFC-PROC-404 for particulate contamination dewpoint and hydrocarbon content .
  - ☐ (4) Solvent flush to meet applicable requirements of particulate and nonvolatile residue contamination .

FIG. 4 - EMI IMPLEMENTATION DOCUMENT (SHT. 2)

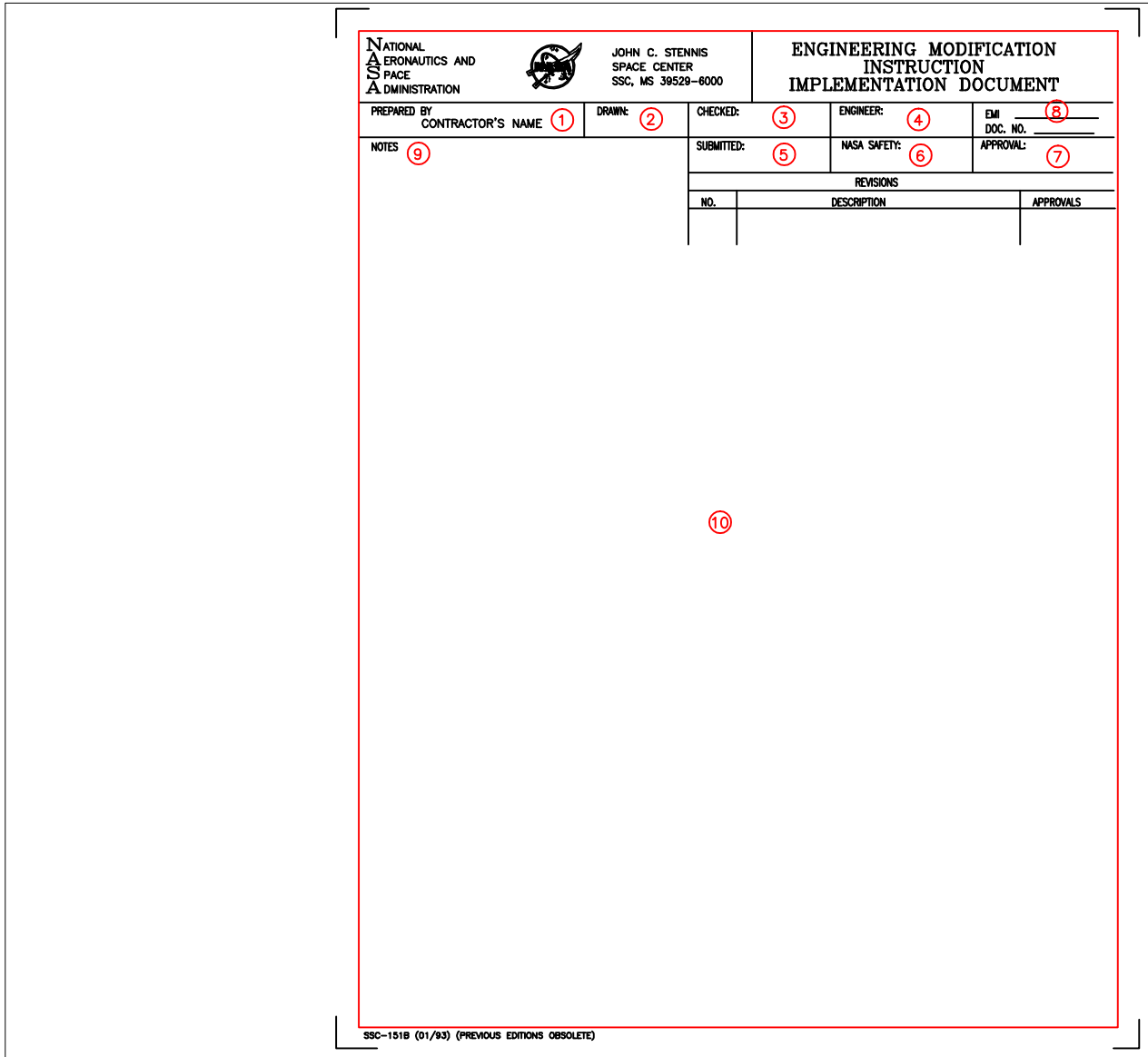
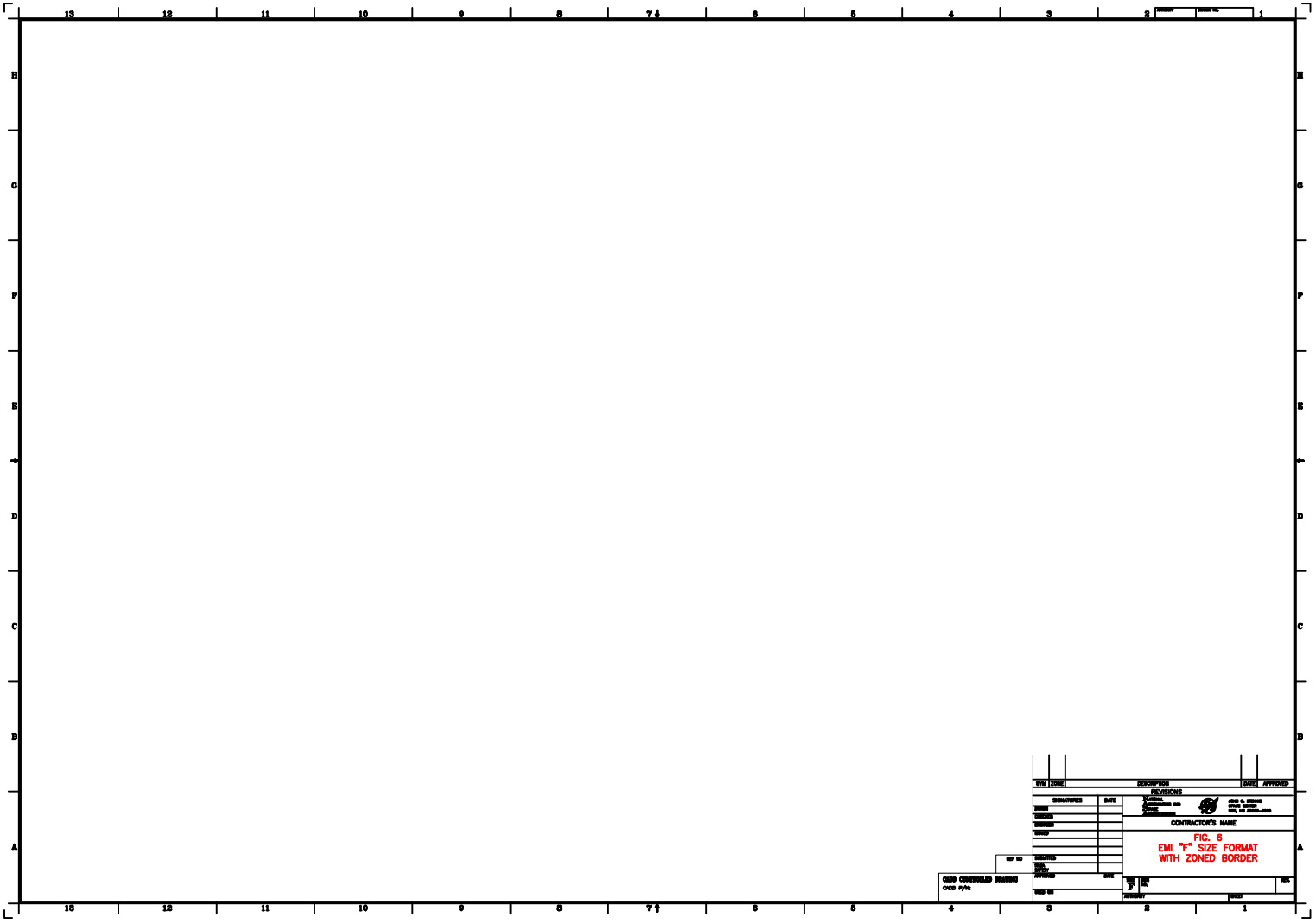


FIG. 5 – EMI "A" SIZE FORMAT

(#) = SEE EMI PREPARATION SECT. 5.4.1C OF (STD 8070.0002)


ITEM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
CONTRACTOR'S NAME
FIG. 6
EMI "F" SIZE FORMAT
WITH ZONED BORDER
SIZE
F
DRAWING
SHEET

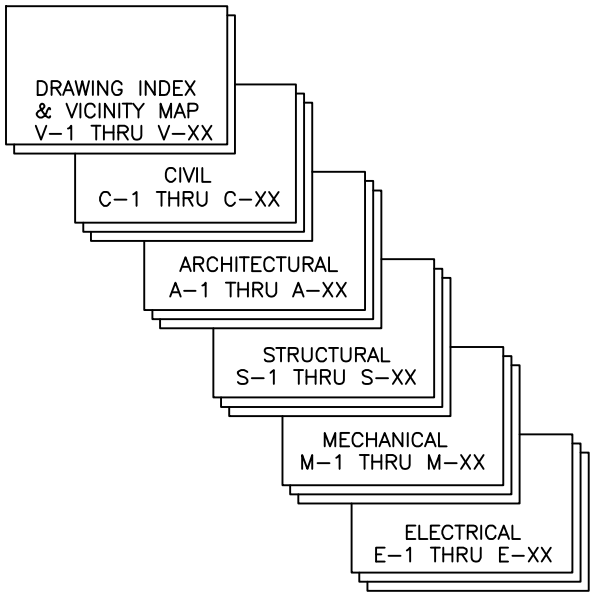


FIG. 7 – TYPICAL DRAWING SET

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

ENGINEERING MODIFICATION INSTRUCTION

PREPARED BY: (1) CONTRACTOR'S NAME	DRAWN: (2)	CHECKED: (3)	ISSUED: (11)	EMI (8) _____ PL NO.____	☐ ADVANCE ☐ FINAL (9)
NOTES (10)		SUBMITTED: (5)	ENGINEER: (4)	REVISIONS	
		NASA SAFETY: (6)	APPROVAL: (7)	NO. (12) / DESCRIPTION / APPROVALS	

FIND NO.	QTY. & UNIT	DESCRIPTION The Following Parts "or Equal" Unless Specified	SOURCE	MATERIAL ☐ LABOR ☐ COST	PROCUREMENT INFORMATION	DATE ORDER	STATUS
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A
					MR		S
					PO		P
					BO		A

SSC-151C- (01/93)

FIG. 8 – EMI PARTS LIST

(#) = SEE EMI PREPARATION SECT. 5.4.1C OF (STD 8070.0002)

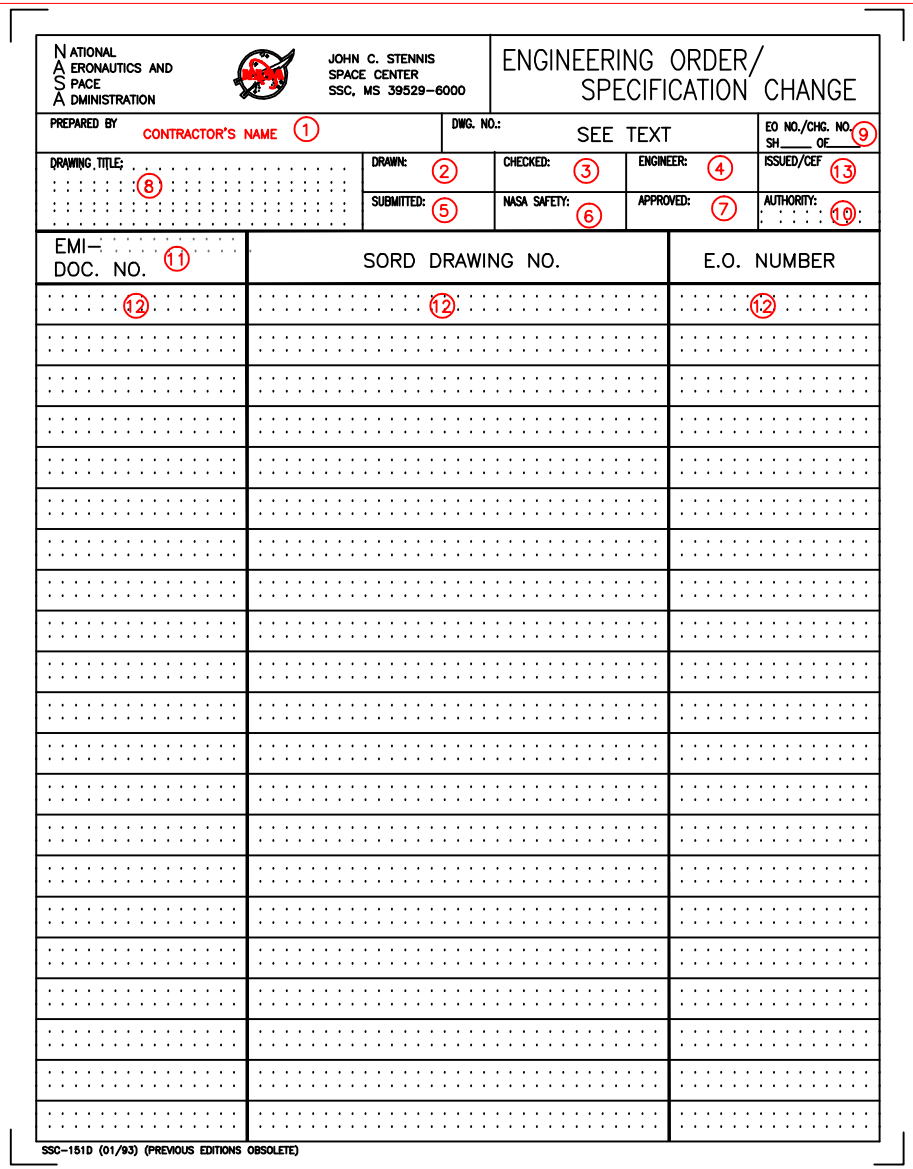


FIG. 9 – ENGINEERING ORDER (E.O. SHEET)

(#) = SEE EMI PREPARATION SECT. 5.4.1C OF (STD 8070.0002)

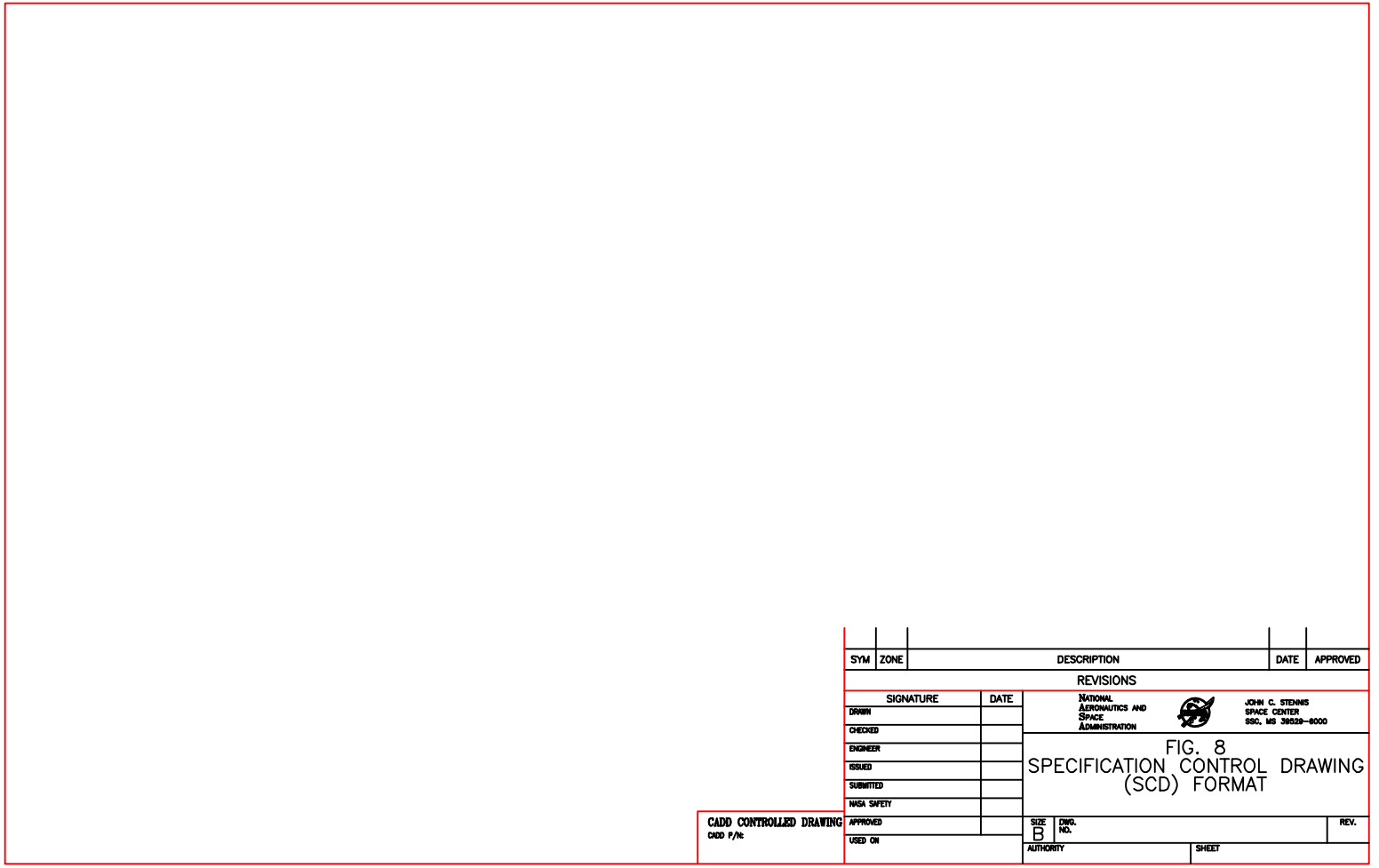


FIG. 8 – SPECIFICATION CONTROL DRAWING (SCD) FORMANT

C

B

A

ME

JOHN C. STENNIS SPACE CENTER

LEGEND:

— MASONRY WALL

— CEILING HEIGHT DEMOUNTABLE PARTITION

— SOUND PROOF CEILIN DEMOUNTABLE PARTITI

— 7'-0" HIGH DEMOUNT

— JUNIOR PARTITION

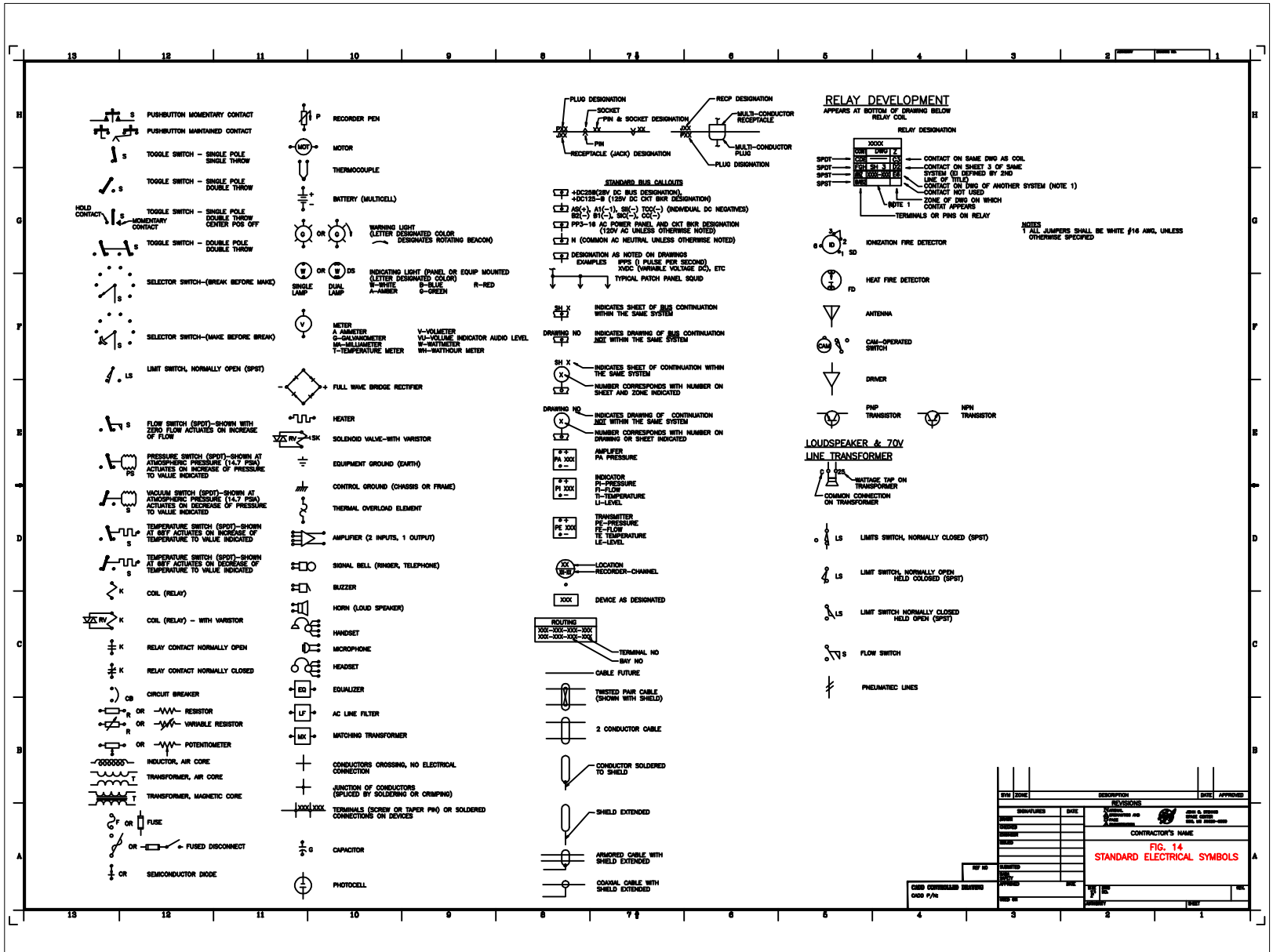
13 12 11 10 9

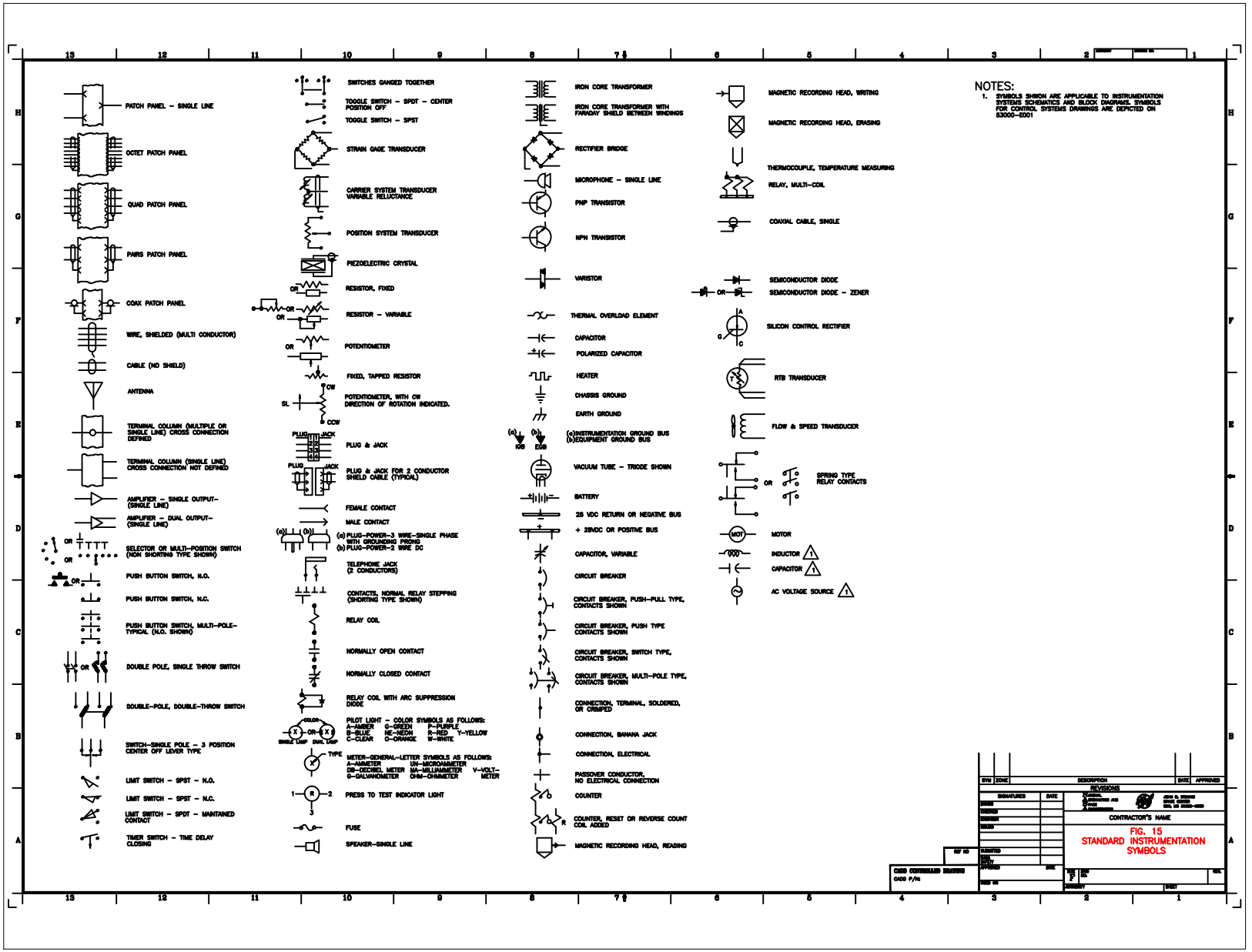
AUTHORITY | DRAWING NO. 00000-X001

AREA 1 | AREA 2 | AREA 3

| LOCATION / SPECIFIC SYSTEM / SUB-CATEGORY / MAJOR CATEGORY | | | | 00 SITE WIDE | 01 AREA 1 | 100 ACKNOWLEDGMENT BLDG. | 101 DOWN BLDG. | 102 DOWN BLDG. | 103 DOWN BLDG. | 104 DATA CTR.-SUPPORT | 105 AUDITORIUM | 106 COMMUNICATION BLDG. | 107 DOWN BLDG. | 108 VCAM RESEARCH | 109 MWT COMP PROC. OPS CTR | 110 VCAM TEST STA. | 111 VAB & LCH. TRANSFER CTR. | 112 VAB & LCH. MMH BLDG. | 113 MANUFACTURING PROJ. BLDG. | 114 VAB & LCH. ADM. BLDG. | 115 WAREHOUSE | 02 AREA 2 | 200 THERMO-SCIENCE CTR. | 201 ENG. & LOGISTICS BLDG. | 202 SITE MAINTENANCE | 203 CMM & MFL SYS. CTL. STA. | 204 GAS CYL. STG. | 205 WAREHOUSE BLDG. | 206 SHOP BLDG. | 207 MAINTENANCE | 208 SHOP | 209 OPS. & BRIDGE EQUIP. BLDG. | 210 DOCK | 211 CABLE SCRN. PROC. BLDG. | 212 CABLE & PNEUMATIC BLDG. | 213 WAREHOUSE | 214 DOWN LABORATORY | 215 ENGINEERING SERV. BLDG. | 216 DOWN OPS. FAC. | 217 U.S. CUSTOMS SERV. BLDG. | 218 HEALTH & FITNESS CENTER | 219 ADMIN. SUPPORT & ENGRG. | BLDG. 1210 | HAZARDOUS WASTE 2110 | 03 AREA 3 | 310 & 3102 SECURITY CONTROL CTR | 311 MAIN TRANSFORMER | 3201 WAREHOUSE | 3202 OPERATIONS | 3203 OPS. & ADMIN. FAC. | 3204 CENTRAL INFO. PLANT | 3205 CENTRAL COMP. BLDG. | 3206 CENTRAL COMP. BLDG. | 3207 RP-1 CONTROL BLDG. | 3212 LOX STORAGE & DOCK | 3213 HYDROGEN DRYER FAC. | 3215 STORE LIST & PRO BLDG. | 3216 MAIN & LOGISTICS FAC. | 3217 SAND BLAST & PAINT FAC. | 3218 METAL CUTTER BLDG. | 3219 SERVICE STATION | 3220 TEST OPS LAB | 3406 LOX STORAGE | 3407 H & HE GAS BATTERY |
|---|---|---

| LOCATION — 4TH DIGIT
SPECIFIC SYSTEM — 3RD DIGIT
SUB-CATEGORY — 2ND DIGIT
MAJOR CATEGORY — 1ST DIGIT | | | | AREA 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | AREA 5 | | | | | | | | | | | | | | | | AREA 6 | | | | AREA 7 | | | | | | | | | | | | | | | | AREA 8 | | | | | | | | | | | | | | | | | | | | AREA 9 | | | | | | | | | | | | | | | | | | | |
|---|---|---


PUSHBUTTON MOMENTARY CONTACT
PUSHBUTTON MAINTAINED CONTACT
TOGGLE SWITCH – SINGLE POLE SINGLE THROW
TOGGLE SWITCH – SINGLE POLE DOUBLE THROW
HOLD CONTACT
MOMENTARY CONTACT
TOGGLE SWITCH – SINGLE POLE DOUBLE THROW CENTER POS OFF
TOGGLE SWITCH – DOUBLE POLE DOUBLE THROW
SELECTOR SWITCH–(BREAK BEFORE MAKE)
SELECTOR SWITCH–(MAKE BEFORE BREAK)
LIMIT SWITCH, NORMALLY OPEN (SPST)
FLOW SWITCH (SPDT)–SHOWN WITH ZERO FLOW ACTUATES ON INCREASE OF FLOW
PRESSURE SWITCH (SPDT)–SHOWN AT ATMOSPHERIC PRESSURE (14.7 PSIA) ACTUATES ON INCREASE OF PRESSURE TO VALUE INDICATED
VACUUM SWITCH (SPDT)–SHOWN AT ATMOSPHERIC PRESSURE (14.7 PSIA) ACTUATES ON DECREASE OF PRESSURE TO VALUE INDICATED
TEMPERATURE SWITCH (SPDT)–SHOWN AT 68°F ACTUATES ON INCREASE OF TEMPERATURE TO VALUE INDICATED
TEMPERATURE SWITCH (SPDT)–SHOWN AT 68°F ACTUATES ON DECREASE OF TEMPERATURE TO VALUE INDICATED
COIL (RELAY)
COIL (RELAY) – WITH VARISTOR
RELAY CONTACT NORMALLY OPEN
RELAY CONTACT NORMALLY CLOSED
CIRCUIT BREAKER
RESISTOR
VARIABLE RESISTOR
POTENTIOMETER
INDUCTOR, AIR CORE
TRANSFORMER, AIR CORE
TRANSFORMER, MAGNETIC CORE
FUSE
FUSED DISCONNECT
SEMICONDUCTOR DIODE
RECORDER PEN
MOTOR
THERMOCOUPLE
BATTERY (MULTICELL)
WARNING LIGHT (LETTER DESIGNATED COLOR DESIGNATES ROTATING BEACON)
INDICATING LIGHT (PANEL OR EQUIP MOUNTED (LETTER DESIGNATED COLOR)
SINGLE LAMP
DUAL LAMP
W–WHITE
A–AMBER
B–BLUE
G–GREEN
R–RED
METER
A AMMETER
G–GALVANOMETER
MA–MILLIAMETER
T–TEMPERATURE METER
V–VOLMETER
VU–VOLUME INDICATOR AUDIO LEVEL
W–WATTMETER
WH–WATTHOUR METER
FULL WAVE BRIDGE RECTIFIER
HEATER
SOLENOID VALVE–WITH VARISTOR
EQUIPMENT GROUND (EARTH)
CONTROL GROUND (CHASSIS OR FRAME)
THERMAL OVERLOAD ELEMENT
AMPLIFIER (2 INPUTS, 1 OUTPUT)
SIGNAL BELL (RINGER, TELEPHONE)
BUZZER
HORN (LOUD SPEAKER)
HANDSET
MICROPHONE
HEADSET
EQUALIZER
AC LINE FILTER
MATCHING TRANSFORMER
CONDUCTORS CROSSING, NO ELECTRICAL CONNECTION
JUNCTION OF CONDUCTORS (SPLICED BY SOLDERING OR CRIMPING)
TERMINALS (SCREW OR TAPER PIN) OR SOLDERED CONNECTIONS ON DEVICES
CAPACITOR
PHOTOCELL
PLUG DESIGNATION
SOCKET
PIN & SOCKET DESIGNATION
PIN
RECEPTACLE (JACK) DESIGNATION
RECP DESIGNATION
MULTI-CONDUCTOR RECEPTACLE
MULTI-CONDUCTOR PLUG
PLUG DESIGNATION
STANDARD BUS CALLOUTS
+DC28S(28V DC BUS DESIGNATION), +DC12S–9 (12SV DC CKT BKR DESIGNATION)
AS(-) A1(-), B1(-), SIC(-) TOC(-) (INDIVIDUAL DC NEGATIVES)
PP3–16 AC POWER PANEL AND CKT BKR DESIGNATION (120V AC UNLESS OTHERWISE NOTED)
N (COMMON AC NEUTRAL UNLESS OTHERWISE NOTED)
DESIGNATION AS NOTED ON DRAWINGS
EXAMPLES IPPS (1 PULSE PER SECOND)
XVDC (VARIABLE VOLTAGE DC), ETC
TYPICAL PATCH PANEL SQUID
INDICATES SHEET OF BUS CONTINUATION WITHIN THE SAME SYSTEM
INDICATES DRAWING OF BUS CONTINUATION NOT WITHIN THE SAME SYSTEM
INDICATES SHEET OF CONTINUATION WITHIN THE SAME SYSTEM
NUMBER CORRESPONDS WITH NUMBER ON SHEET AND ZONE INDICATED
INDICATES DRAWING OF CONTINUATION NOT WITHIN THE SAME SYSTEM
NUMBER CORRESPONDS WITH NUMBER ON DRAWING OR SHEET INDICATED
AMPLIFER PA PRESSURE
INDICATOR PI–PRESSURE FI–FLOW TI–TEMPERATURE LI–LEVEL
TRANSMITTER PE–PRESSURE FE–FLOW TE TEMPERATURE LE–LEVEL
LOCATION RECORDER–CHANNEL
DEVICE AS DESIGNATED
ROUTING
TERMINAL NO
BAY NO
CABLE FUTURE
TWISTED PAIR CABLE (SHOWN WITH SHIELD)
2 CONDUCTOR CABLE
CONDUCTOR SOLDERED TO SHIELD
SHIELD EXTENDED
ARMORED CABLE WITH SHIELD EXTENDED
COAXIAL CABLE WITH SHIELD EXTENDED
RELAY DEVELOPMENT
APPEARS AT BOTTOM OF DRAWING BELOW RELAY COIL
RELAY DESIGNATION
CONTACT ON SAME DWG AS COIL
CONTACT ON SHEET 3 OF SAME SYSTEM (SI DEFINED BY 2ND LINE OF TITLE)
CONTACT ON DWG OF ANOTHER SYSTEM (NOTE 1)
CONTACT NOT USED
ZONE OF DWG ON WHICH CONTAT APPEARS
NOTE 1
TERMINALS OR PINS ON RELAY
NOTES
1 ALL JUMPERS SHALL BE WHITE #16 AWG, UNLESS OTHERWISE SPECIFIED
IONIZATION FIRE DETECTOR
HEAT FIRE DETECTOR
ANTENNA
CAM–OPERATED SWITCH
DRIVER
PNP TRANSISTOR
NPN TRANSISTOR
LOUDSPEAKER & 70V LINE TRANSFORMER
WATTAGE TAP ON TRANSFORMER
COMMON CONNECTION ON TRANSFORMER
LIMITS SWITCH, NORMALLY CLOSED (SPST)
LIMIT SWITCH, NORMALLY OPEN HELD COLOSED (SPST)
LIMIT SWITCH NORMALLY CLOSED HELD OPEN (SPST)
FLOW SWITCH
PNEUMATIEC LINES
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
CONTRACTOR'S NAME
FIG. 14
STANDARD ELECTRICAL SYMBOLS
CAGE CONTROLLED DRAWING
CAGE P/N:
REF ID
SUBMITTED
SIZE
SCALE
APPROVED
DWG NO
REV
SHEET



NOTES:

1. SYMBOLS SHWON ARE APPLICABLE TO INSTRUMENTATION SYSTEMS SCHEMATICS AND BLOCK DIAGRAMS. SYMBOLS FOR CONTROL SYSTEMS DRAWINGS ARE DEPICTED ON 83000–E001

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	

CONTRACTOR'S NAME

FIG. 15
STANDARD INSTRUMENTATION SYMBOLS

REF NO	
SUBMITTED	
APPROVED	DATE

CADD CONTROLLED DRAWING
CADD P/N:

SIZE	CAGE NO.	REV.
D		
ASSEMBLY		SHEET

LINE SYMBOLS

- INSULATED LINES
- INSULATED LINES
- SECONDARY LINES
- PRIMARY LINES
- PIPING SHOWN FOR REFERENCE
- INSTRUMENT OR CONTROL TUBING
- INSTRUMENT OR CONTROL WIRING
- EQUIPMENT BOUNDARIES
- NON-CONNECTING LINES
- CONNECTING LINES
- PNEUMATIC VLV ACTUATION (DOUBLE LINES)
- HYDRAULIC VLV ACTUATION (SINGLE LINE)
- HYDRAULIC VLV ACTUATION (DOUBLE LINES)
- ABOVE GROUND/BELOW GROUND PIPING INTERFACE
- SPEC BREAK
- ELECTROMAGNETIC, OPTICAL, RADIATION, OR SONIC SENSING
- INTERNAL DCS LINK

COMPONENT DESIGNATOR (SSC-97-005 & SSC-97-011)

(EXAMPLE 1)

VA-1A1001-LO

- SYSTEM FLUID (SEE NOTE 2)
- DESIGNATOR NUMBER-1A ___ DENOTES SII-A1 FORMERLY 4 DIGIT # SEE HISTORY COPY
- COMPONENT TYPE (SEE NOTE 1)

NOTE 1: COMPONENT TYPE OF COE INSTALLED HAND & CHECK VALVES (VA), GIVEN FOR INFORMATION ONLY AND DOES NOT ALTER EXISTING IDENTIFICATION.

NOTE 2: SYSTEM FLUID OF COE INSTALLED COMPONENTS EXCLUDING HAND & CHECK VALVES (VA), IS GIVEN FOR REFERENCE ONLY AND DOES NOT ALTER EXISTING IDENTIFICATION.

GENERAL SITE AREAS

VA-1A1001-LO	1A ___ DENOTES SII-A1
VA-2A1001-LO	2A ___ DENOTES SII-A2
VA-3A1001-LO	3A ___ DENOTES "B" COMPLEX/"B1"
VA-4A1001-LO	4A ___ DENOTES RP-1 STORAGE & DOCK
VA-5A1001-LO	5A ___ DENOTES HIGH PRESSURE GAS FACILITY
VA-6A1001-LO	6A ___ DENOTES LOX BARGE & DOCK
VA-7A1001-LO	7A ___ DENOTES MISC. SITE WIDE
VA-8A1001-LO	8A ___ DENOTES LH2 DOCK & BARGE
VA-9A1001-LO	9A ___ DENOTES PORTABLE EQUIPMENT
VA-10A1001-LO	10A ___ DENOTES "E1"
VA-11A1001-LO	11A ___ DENOTES "D" ROAD GAS BATTERY (PROPELLANT BLVD)
VA-12A1001-LO	12A ___ DENOTES "H" COMPLEX
VA-14A1001-XX	14A ___ DENOTES "E2 CELL 1"
VA-14B1001-XX	14B ___ DENOTES "E2 CELL 2"
VA-15A1001-XX	15A ___ DENOTES "E3"
VA-16A1001-XX	16A ___ DENOTES "B2"
VA-17A1001-XX	17A ___ DENOTES "E4"

INSTRUMENT SYMBOLS & COMPONENT/LINE STATUS

- F M S — CONTROL PACKAGE WITH FAILURE MODE SELECTOR (FAIL OPEN OR FAIL CLOSE ELECTRIC SWITCHING CAPABILITY) (010)
- GN → MC / CP-205 TYPE D (SEE BELOW) — CONTROL PACKAGE WITH NUMBER AND TYPE (011)
- MC — M INDICATES MONITORING CAPABILITY; C INDICATES REMOTE CONTROL CAPABILITY
- GC-1 — INSTRUMENT READOUT LOCATION CODE (029)
- PS XXX, PE XXX, E/P XXX, PI 507 — LOCALLY MOUNTED INSTRUMENT (032)
- PI 508 — REMOTELY MOUNTED INSTRUMENT (050)
- P — DIFFERENTIAL PRESSURE TRANSMITTER (069)

LINE IDENTIFICATION (SEE SSC-97-012)

6"-HA-1A23-A

- 6" — LINE SIZE
- HA — SYSTEM FLUID
- 1A23 — LINE NUMBER-FORMERLY 3 DIGIT # SEE HISTORY COPY
- A — PIPE MATERIAL SPEC.-SEE NOTE

NOTE: FINAL LETTERS OF LINE IDENT. NO. REFERS TO A SPECIFIC SECTION (PPA) OF PIPING STANDARD "SSC-STD.-PP"

LINE BREAK/RESUMPTION INDICATION

(2) 11CGK-P001 SH 2 (1) (1) FOR BREAK POINT, ADD ID OF COMPONENT, INSTRUMENT OR EQUIPMENT TO WHICH LINE IS GOING

(2) FOR RESUMPTION POINT, ADD ID OF COMPONENT, INSTRUMENT OR EQUIPMENT FROM WHICH LINE IS COMING

ABBREVIATIONS

ACC	ACCUMULATOR
ACL	ACCELEROMETER
AE	AIR ELIMINATOR
AV	AIR VENT (002)
B	BOILER
BFP	BACK FLOW PREVENTOR (070)
C	COMPRESSOR
CE	COOLING ELEMENT
CHV	CHECK VALVE (009)
CI	CAVITATION INDICATOR
CP	CONTROL PACKAGE
CV	CAVITATING VENTURI (008)
DAH	DETECTOR ALARM, HIGH
DAL	DETECTOR ALARM, LOW
DC	DEIONIZATION CARTRIDGE
DCS	DISTRIBUTED CONTROL SYSTEM
DE	DETECTING ELEMENT
DL	DOME LOADING REGULATOR (016)
EJ	EXPANSION JOINT
E/P	ELECTRIC TO PNEUMATIC TRANSDUCER
F	FILTER: LF LIQUID FILTER-GF GAS FILTER (028)
FA	FLAME ARRESTOR
FAL	FLOW ALARM LOW
FCV	FLOW CONTROL VALVE
FE	FLOW ELEMENT
FFGI	FLAME FRONT GENERATOR IGNITER
FH	FLEXIBLE HOSE (021)
FI	FLOW INDICATOR
FIC	FLOW INDICATOR CONTROL
FIR	FLOW INDICATOR RECORDER
FK	FLARE STACK
FLM	FLOW METER (023)
FMV	FLOW METER VENTURI
FO	FLOW ORIFICE
FS	FLOW SWITCH
FSV	FLOW STRAIGHTENING VANE
FT	FLOW TRANSMITTER/TRANSDUCER
FX	FLOW TEST POINT
FZS	FLOW VALVE POSITION SWITCH
FZT	FLOW VALVE POSITION TRANSDUCER
FZY	FLOW VALVE SIGNAL CONVERTER
GF	GAS FILTER
GFE	GOVERNMENT FURNISHED EQUIPMENT
GS	GAUGE SAVER
GSE	GROUND SUPPORT EQUIPMENT
GTR	TRACE
GW	WILKS
HCAH	HYDROCARBON ALARM, HIGH
HCX	HYDROCARBON ANALYZER
HD	HYDRAULIC LINES
HIC	HAND INDICATOR CONTROLLER
HLR	HAND LOADED REGULATOR (026)
HOMV	HYDRAULICALLY OPERATED MOTOR VALVE
HPCV	HYDRAULIC PRESSURE CONTROL VALVE
HPV	HIGH POINT VENT
HS	HAND SWITCHOR HYDRAULIC SERVICE
HTR	HEATER
I/P	CURRENT TO PNEUMATIC TRANSDUCER
LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LC	LOAD CELL
LCV	LEVEL CONTROL VALVE
LE	LEVEL ELEMENT (PROBE)
LF	LIQUID FILTER
LI	LEVEL INDICATOR
LIC	LEVEL INDICATOR CONTROLLER
LPD	LOW POINT DRAIN
LS	LEVEL SWITCH
LT	LEVEL TRANSMITTER
M	MOTOR
MAH	MOISTURE ALARM, HIGH
MC	MONITOR AND REMOTE CONTROL
MFP	MASTER FACILITY PANEL
MI	MOISTURE INDICATOR
MSV	MOTOR VALVE SOLENOID
MV	MOTOR VALVE
MXR	MIXER
MZS	MOTOR VALVE POSITION SWITCH
NS	NITROGEN SERVICE
OCC	OPEN-CLOSE CONTROL
P	PUMP (046)
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PCV	PRESSURE CONTROL VALVE (044)
PD	PULSATION DAMPENER (045)
PDAH	PRESSURE DIFFERENTIAL ALARM HIGH
PDAL	PRESSURE DIFFERENTIAL ALARM LOW
PDE	PRESSURE DIFFERENTIAL ELEMENT
PDI	PRESSURE DIFFERENTIAL INDICATOR
PDS	PRESSURE DIFFERENTIAL SWITCH
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PE	PRESSURE ELEMENT
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATOR CONTROLLER
PORV	PILOT OPERATED RELIEF VALVE (041)
PRV	PRESSURE RELIEF VALVE
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
PX	PRESSURE TAP
PZS	PRESSURE VALVE POSITION SWITCH
PZT	PRESSURE VALVE POSITION TRANSDUCER
PZY	PRESSURE SYSTEM SERVO
RD	RUPTURE DISC (051)
RO	RESTRICTING ORIFICE
RV	RELIEF VALVE (049)
RTD	RESISTIVE TEMPERATURE DETECTER
SC	SCREEN (052)
SP	SPOOL PIECE (055)
ST	STRAINER (068)
SV	SOLENOID VALVE (054)
TAH	TEMPERATURE ALARM HIGH
TAL	TEMPERATURE ALARM LOW
TC	THERMOCOUPLE
TCV	TEMPERATURE CONTROL VALVE
TE	TEMPERATURE ELEMENT (RTB E-COMPLEX)
THC	TOTAL HYDROCARBON
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATOR CONTROLER
TS	TEMPERATURE SWITCH
TT	TEMPERATURE TRANSMITTER
V	VESSEL
VA	VALVE-MANUAL (064)
VE	VACUUM ELEMENT
VI	VACUUM INDICATOR
VIT	VACUUM INDICATOR TRANSMITTER
VJ	VACUUM JACKETED LINE
VO	VENTURI ORIFICE
VP	VALVE PIT (065)
VPV	VAR. POS. VALVE (071)
VV	VENT VALVE
VZS	VARIABLE VACUUM POSITION SWITCH
VZT	VARIABLE VACUUM POSITION TRANSMITTER
VZY	VARIABLE VACUUM SIGNAL CONVERTER
X	HEAT EXCHANGER OR VAPORIZER (066)

NOTE:

1 AV AIR VENT (002)

NUMBER DENOTES CADD SYM\ PIPING CONTROL NUMBER

FLUID DESIGNATOR

AG	ACETYLENE
BA	BREATHABLE AIR
CA	COMPRESSED AIR (LOW PRESSURE)
CO	CARBON DIOXIDE
CHW	CHILLED WATER
CW	COOLING/CONDENSER WATER
DI	DEIONIZED WATER
DW	DELUGE WATER
EG	ETHYLENE GLYCOL
FL	FUEL LUBE
FO	FUEL OIL
FR	FREON
GF	FLUORINE GAS
GH	HYDROGEN GAS
GL	GASOLINE
GM	GASEOUS METHANE
GN	NITROGEN GAS
GO	OXYGEN GAS
HA	AIR HIGH PRESSURE
HD	HYDRAULIC
HE	HELIUM GAS
H202	HYDROGEN PEROXIDE
HV	HYDROGEN VENT/DISPOSAL
HW	HOT WATER
IW	INDUSTRIAL WATER
JP-8	JET PROPELLANT
K	CONDENSATE
LH	LIQUID HYDROGEN
LM	LIQUID METHANE
LN	LIQUID NITROGEN
LO	LIQUID OXYGEN
LSO	LIQUID SOLVENT
LU	LUBRICANT
NG	NATURAL GAS
OV	OXYGEN VENT/DISPOSAL
PO	PRESERVATIVE OIL
PW	POTABLE WATER
RP	ROCKET PROPELLANT
RW	RIVER WATER
S	STEAM
SN	SODIUM NITRATE
TEA	TRIETHYLALUMINUM
TEB	TRIETHYLBORANE
TT	TRIETHYL ALUMINUM/TRIETHYL BORON
VAC	VACUUM

N

STANDARD NORTH ARROW

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER SSC, MS 39529-6000

CONTRACTOR'S NAME

FIG. 16 LEGEND FOR PIPING SCHEMATICS SHT. 1

SIZE F | DWG NO. | REV.

AUTHORITY | SHEET

COMPONENT SYMBOLS

AIR & VACUUM RELIEF VALVE (RV) 001 — 1 (TYPICAL)

AIR VENT 002

OR ATMOSPHERIC VENT

ANGLE VALVE (VA) 003

NO BUTTERFLY VALVE NORMALLY OPEN

NC BUTTERFLY VALVE NORMALLY CLOSED

GLOBE/THROTTLE VALVE (VA) 060

BALL VALVE 11

AUTOMATIC DRIP 004

BLIND FLANGE 005

BREATHER CAP

CAP, SCREWED 006

CAP, WELDED 007

CV CAVITATING VENTURI 008

CHECK VALVE 009

DELUGE SPRAY NOZZLE 012

DELUGE WASHDOWN CONNECTION 013

DIRECTION OF FLOW (VENT OR RETURN) 014

DIRECTION OF FLOW (PRIMARY) 015

DL XXX DOME LOADER 016

DOME LOADED PRESSURE CONTROL VALVE

DRAIN (OPEN) 017

DRAIN TRAP

EXPANSION JOINT 018

FIVE WAY MANIFOLD VALVE (VA) 019

FLANGE 020

FLEXIBLE HOSE 021

FLOW CONTROL VALVE 022

FLEXFLOW/DIAPHRAM VALVE

FLOW METER 023

FLOW METERING VENTURI 024

FOUR WAY VALVE (VA) 025

HLR HAND LOADED REGULATOR 026

HAND OPERATED PRESSURE REDUCING REGULATOR

HOSE COUPLING 027

IN LINE FILTER (F) 028

TO INSTRUMENT / CALIBRATE / VENT / FROM TAP — INSTRUMENT TAP 030

LEVEL GAUGE 031

CALIBRATION VALVE

LUBRICATOR, AIR LINE (PIPE LINE OILER) 034

MECHANICAL (DRESSER) COUPLING 035

GATE VALVE 037

M MOTOR VALVE

M FO MOTOR VALVE—FAIL OPEN

M FC MOTOR VALVE—FAIL CLOSED 036

NEEDLE VALVE

ORIFICE (RESTRICTING) 038

OVER THE PLUG FLOW 039

PERFORATED PIPE SPRAY 040

PILOT OPERATED RELIEF VALVE 041

NOMINAL MICRON RATING

GAS FILTER (GF) 042

F LIQUID FILTER (LF)

PLUG VALVE (VA) 043

PC PRESSURE CONTROL VALVE 044

PS PRESSURE SWITCH

POST INDICATOR VALVE

PULSATION DAMPENER 045

PRESSURE INDICATOR (PI)

PUMP 046

QUICK DISCONNECT FITTING 047

HOSE CONNECTION COUPLING

QUICK DISCONNECT COUPLING

REDUCER 048

STRAIGHT THROUGH RELIEF VALVE

DUAL OUTLET PRESS OPERATED RV

RUPTURE DISC 051

RUPTURE DISC

SCREEN OR STRAINER 052

SIGHT GLASS 053

E SOLENOID VALVE 054

S 2-WAY SOLENOID VALVE

S 3-WAY SV 058

S 4-WAY SV

SPOOL PIECE (SP) 055

NO INDICATES OPEN DURING NORMAL OPERATIONS

NC INDICATES CLOSED DURING NORMAL OPERATIONS

LO LOCKED OPEN

LC LOCKED CLOSED

THREADED PLUG 056

THREE WAY MANIFOLD VALVE (VA) 057

THREE WAY VALVE (VA) 059

TWO WAY MANIFOLD VALVE (BLOCK & BLEED) (VA) 061

UNDER THE PLUG FLOW 062

UNION 063

VACUUM JACKETED PIPE

VALVE, MANUAL (VA) 064

VALVE PIT 065

VAPORIZER OR HEAT EXCHANGER 066

WASHDOWN HOSE CONNECTION 067

STRAINER 068

BACK FLOW PREVENTOR 070

RELIEF VALVE 049

THERMAL RELIEF VALVE

QUICK-OPENING VALVE

SAFETY VALVE

PLUG

COCK

CONCENTRIC REDUCER

ECCENTRIC REDUCER

VARIABLE DISP PRESS COMP HYDRAULIC PUMP

M HYDRAULIC PUMP ELECTRIC MOTOR

ADJUST RELIEF VALVE

ACCUMULATOR

ACCUMULATOR PRESS GAUGE ARRANGEMENT

3-WAY/3-POS NORMALLY CLOSED OR OPEN SOLENOID VALVE

5 4 1 2 3 5-WAY SOLINOID VALVE

EQUIPMENT

VACUUM PUMP

CENTRIFUGAL FAN

CENTRIFUGAL FAN WITH INLET VANES

RECIPROCATING PUMP

PROPELLER FAN

VESSEL OR TANK

RECIPROCATING AIR COMPRESSOR

MOISTURE ELIMINATOR

VERTICAL SUMP PUMP

TURBINE

CANNED PUMP

M FINNED FAN VAPORIZER

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

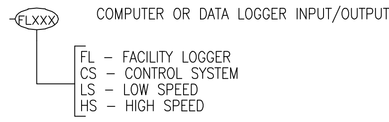
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

CONTRACTOR'S NAME

FIG. 17
LEGEND FOR
PIPING SCHEMATICS
SHT. 2

SIZE F | DWG NO. | REV.

AUTHORITY | SHEET



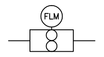
COMPUTER OR DATA LOGGER INPUT/OUTPUT

FL – FACILITY LOGGER
CS – CONTROL SYSTEM
LS – LOW SPEED
HS – HIGH SPEED

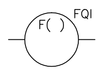
FLOW SENSORS



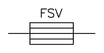
SONIC CHOKE FLOW METER



TURBINE OR PROPELLER TYPE



IN LINE INSTRUMENT
FQI – TOTALIZER



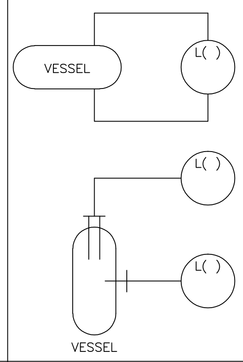
FLOW STRAIGHTENING VANES

FIRE DETECTORS



ID – IONIZATION DETECTOR
SD – SMOKE DETECTOR
XD – FLAME DETECTOR
ND – FIXED TEMP THERMAL DETECTOR
RD – RATE OF RISE, THERMAL DETECTOR
CD – RATE COMPENSATED THERMAL DETECTOR

LEVEL SENSORS

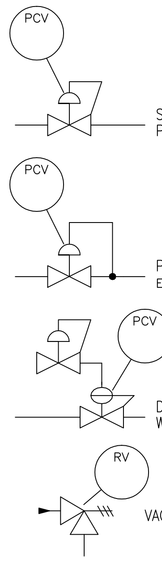


DIFFERENTIAL PRESSURE

MULTIPLE PROBE

CONTACTING PROBE, CAPACITANCE

SELF–ACTIVATING DEVICES PRESSURE



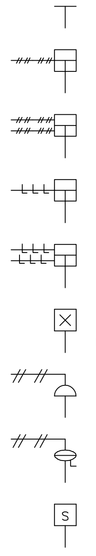
SELF CONTAINED, HAND PRESSURE REGULATOR

PRESSURE REGULATOR WITH EXTERNAL TAP

DOME LOADED PRESSURE REGULATOR WITH HAND REGULATOR EXT TAP

VACUUM RELIEF VALVE, ANGLE TYPE

VALVE ACTIVATORS



MANUAL

SINGLE ACTING PNEUMATIC CYLINDER

DOUBLE ACTING PNEUMATIC CYLINDER

SINGLE ACTING HYDRAULIC CYLINDER

DOUBLE ACTING HYDRAULIC CYLINDER

UNSPECIFIED (TO BE INDICATED ON DWG)

PNEUMATIC DIAPHRAM (WITH OR WITHOUT POSITIONER)

PRESS BALANCED PNEU DIAPHRAM

SOLENOID ACTUATOR

EMERGENCY SHUTDOWN

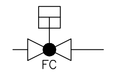


EMERGENCY SHUTDOWN

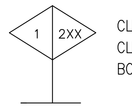
A = INSTANTANEOUS
B = TIMER #1
C = TIMER #2

ALL UNDESIGNATED MV'S, VPV'S & SV'S WILL BE DE–ENERGIZED BY TIMER #3

VALVE FAILURE MODE



FC – FAIL CLOSED
FO – FAIL OPEN
FL – FAIL LOCKED
FI – FAIL INDETERMINATE



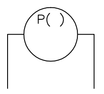
CLEAN LEVELS INDICATED IN CLEANING BREAK INDICATOR BOX ARE PER SSC STD 79–001

1. ALL PIPE BOSS CONNECTIONS SHALL CONFORM TO THE FOLLOWING TABLE FOR THE PARTICULAR APPLICATION AND PRESSURE, UNLESS OTHERWISE NOTED:

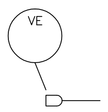
BOSS TYPES	≤ 6600 psig.	>6600 psig
PURGE/BLEED LINE	3/4" MS33649	3/4" AE SLIMLINE MEDIUM PRESSURE
PRESSURE TRANSDUCER	1/4" MS33649	3/4" AE SLIMLINE MEDIUM PRESSURE
THERMOCOUPLE	1/4" MS33649	3/4" AE SLIMLINE MEDIUM PRESSURE
RTD	1/4" MS33649 SPECIAL 0.3906" BORE	3/4" AE SLIMLINE MEDIUM PRESSURE
SPARE BOSS	3/4" MS33649	3/4" AE SLIMLINE MEDIUM PRESSURE

2. MEDIUM PRESSURE TUBING WILL BE DESIGNATED AS "MP".
3. TUBING SHALL CONFORM TO SSC STD 47–220 UNLESS OTHERWISE INDICATED.
4. ALL INSTRUMENTATION LINES SHALL BE 1/4" TUBING CONFORMING TO SSC STD 47–220. USE 0.049" WALL THICKNESS FOR MAWP GREATER THAN 5000 PSIG AND 0.035" WALL THICKNESS FOR MAWP OF 5000 PSIG OR LESS.

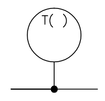
INSTRUMENTATION – GENERAL



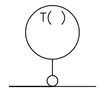
IN LINE CONNECTION DIFFERENTIAL PRESSURE (DELTA P)



VACUUM SENSING ELEMENT



DIRECT CONNECTION (PRESSURE OR TEMPERATURE)

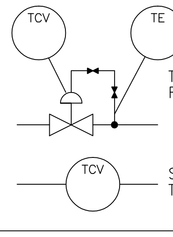


THERMOWELL CONNECTION

MISCELLANEOUS DEVISES

- INTERLOCK LOGIC
- ABORT LOGIC
- CONTROLLED ADVANCE/ARMING LOGIC
- REDLINE MEASUREMENT
- TD – TIME DELAY
- VC – VALVE POSITION CHECK

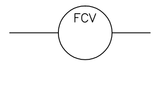
SELF–ACTIVATING DEVICES TEMPERATURE



TEMPERATURE REGULATOR, FILLED SYSTEM TYPE

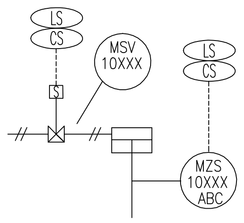
SELF ACTUATED TEMPERATURE REGULATOR

SELF–ACTIVATING DEVICES FLOW



SELF CONTAINED FLOW REGULATOR

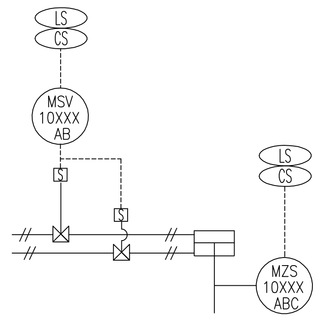
MOTOR VALVE ACTUATORS



TYPE 1 TYPICAL

(TYPE 1ABC, FAIL OPEN, PNEUMATIC SHOWN)

PNEUMATIC OR HYDRAULIC
SINGLE SOLENOID (MSV)
ACTUATION PRESSURE MAY BE PORTED ONE OF THE FOLLOWING WAYS (AS INDICATED ON DRAWING):
1) DIRECTLY TO TOP OF ACTUATOR (SHOWN)
2) DIRECTLY TO BOTTOM OF ACTUATOR
3) TO TOP & BOTTOM OF ACTUATOR VIA USE OF PILOT VALVES OPERATED BY PRESSURE FROM SOLENOID VALVE

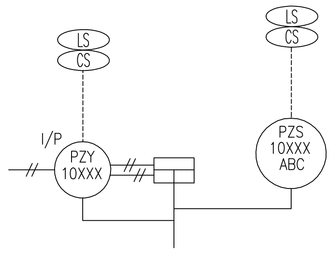


TYPE 2 TYPICAL

(TYPE 2ABC, PNEUMATIC SHOWN)

PNEUMATIC OR HYDRAULIC
DOUBLE SOLENOID–SINGLE COMMAND (MSV–10XXXAB)

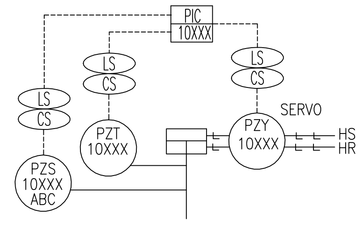
CONTROL VALVE ACTUATORS



TYPE 3 TYPICAL

(TYPE 3ABC SHOWN)

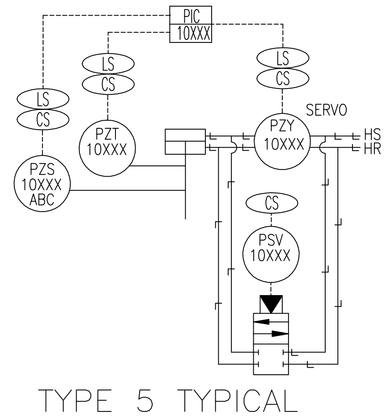
PNEUMATIC ONLY
I/P POSITIONER



TYPE4 TYPICAL

(TYPE 4ABC SHOWN)

HYDRAULIC ONLY



TYPE 5 TYPICAL

(TYPE 5ABC, FAIL CLOSED SHOWN)

FAIL SAFE SOLENOID
HYDRAULIC ONLY
CONSULT VALVE MANUALS FOR EXACT CONFIGURATION

VALVE ACTUATOR TYPES–QUICK REFERENCE TABLE

TYPE*	ACTUATION	COMMAND TO CS, FL, LS**	POSITION FEEDBACK TO CS, FL, LS**	FAIL–SAFE SOLENOID COMMAND TO CS, FL
1	PNEUMATIC OR HYDRAULIC	SINGLE SOLENOID (MSV)	N/A	N/A
2	PNEUMATIC OR HYDRAULIC	DUAL SOLENOID (MSV–AB)	N/A	N/A
3	PNEUMATIC	I/P POSITIONER (VZY, PZY, FZY)	N/A	N/A
4	HYDRAULIC	SERVO (VZY, PZY, FZY)	LVDT FEEDBACK (VZT, PZT, FZT)	N/A
5	HYDRAULIC	SERVO (VZY, PZY, FZY)	LVDT FEEDBACK (VZT, PZT, FZT)	FAIL–SAFE SOLENOID (VSV, PSV, FSV)

* LIMIT SWITCH MODIFIERS FOR ALL VALVE TYPES (MZS, VZS, PZS, OR FZS)

A–SINGLE LIMIT SWITCH CONNECTED TO CS, FL AND LS
AB–TWO LIMIT SWITCHES CONNECTED TO CS, FL AND LS
ABC–THREE LIMIT SWITCHES CONNECTED TO CS, FL AND LS

** STORAGE AREA MODIFIER

X–NO CONNECTIONS TO LS

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
SSC, MS 39529–6000

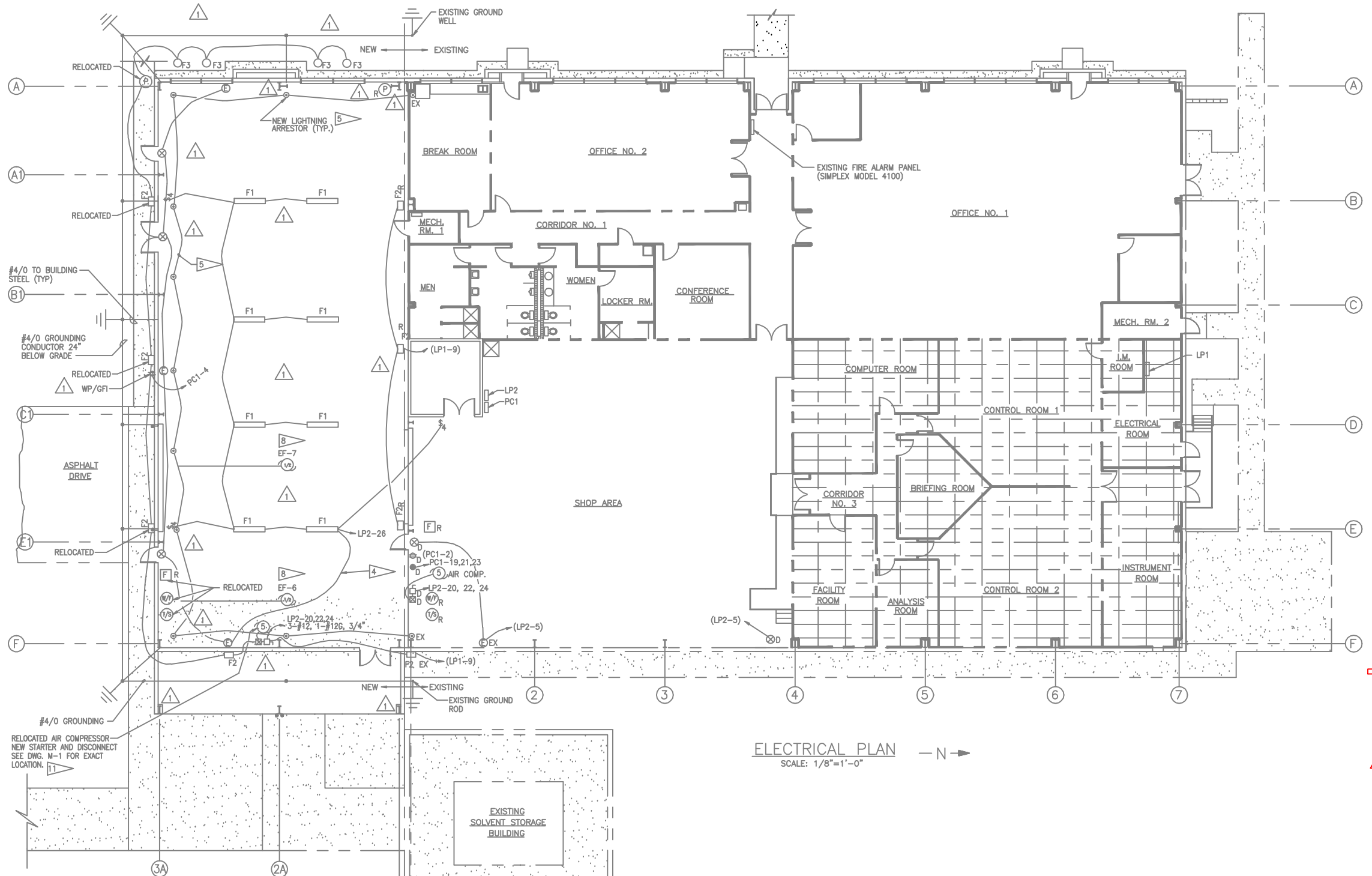
CONTRACTOR'S NAME

FIG. 18
LEGEND FOR PIPING SCHEMATICS
SHT. 3

SIZE	DWG NO.	REV.
F		

AUTHORITY | SHEET

MIKE'S RIVER
SOUTHERN RAILROAD
TRENT LOTT PARK
OLD HWY. 43
RD.
PROPEL
PROPELLANT
1100
1103
1107
TR 262
TR 246
TR 242
1003
1000B
1106
1005
1007
1008
1006
BALCH BOULEVARD
1105
1110
LAGOON
0053
OLD HWY. 43
3204
3219
3312
3220
2040
RD. "J"
2201
2206
2205
2101
2202
2203
2209
2210
2104
ENDEAVOUR BOULEVARD
2105 STORAGE
2204
2207
2119
2106
TANK
2120
2404
S2127
S2126
T321
RD. "H"
S3210
3207
3203
3203A
3209
3205
3206
3212
3202
3208
NDBC BOUY RAMP
NDBC DOCK
T3201A
3201
3200
RD. "F"
2317
2311
2310
D302 (DOCKS)
2315
2316
OLD HWY. 43
3110
3101
3102
3408
TRENT LOTT PKWY.
C
B
A
N253,000
N248,000
E241,800
E246,800
E251,800
13
12
11
10
9
7
8
9
1
2
3
0054
UPPER GAINESVILLE ROAD
PISTOL SHED
2510
T2413
T2411
T2414
T2415
CONCRETE RAMP AND PIER
T2410
T2409
S2420
2425
2423
T2426
0045 (MARINA)
S2427
EAST PEARL RIVER
ENDEAVOUR BOULEVARD
2408
2406
2109
S2110
S2111
LOWER GAINESVILLE RD
LOWER GAINESVILLE ROAD
S2436
S2435
2402
T2407
2403
2437
2438
T2401 (DOCK)
DREDGE DISPOSAL



ELECTRICAL PLAN — N
SCALE: 1/8"=1'-0"

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70).
2. ALL INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT) AND ALL EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED STEEL (RGS). MINIMUM SIZE SHALL BE 3/4".
3. ALL WIRING SHALL BE THWN, COPPER WITH 600 VOLT INSULATION. WIRE SIZE SHALL BE #12 UNLESS INDICATED OTHERWISE.
4. CONNECT BATTERY PACKS IN EMERGENCY FIXTURES AHEAD OF SWITCHES.
5. INSTALL LIGHTNING ARRESTORS AT BOTH CORNERS AND ALONG EDGE OF ROOF. CONNECT ALL LIGHTNING ARRESTORS AND NEW EXHAUST FANS (TYP OF 2) TOGETHER WITH #4/0 COPPER AND PROVIDE DOWN COMERS AT EACH CORNER (TYP OF 2) AND FROM ROOF PEAK (TYP OF 1). CONNECT TO GROUNDING SYSTEM. MATCH EXISTING SYSTEM AND MASTER LABEL. THE ENTIRE SYSTEM. EXISTING SYSTEM WAS PROVIDED BY THOMPSON LIGHTING PROTECTION INC.
6. ALL GROUND AND LIGHTNING CONNECTIONS SHALL BE EXOTHERMICALLY WELDED.
7. USE EXISTING 20A, 1P SPARE BREAKER (RELABEL PANEL).
8. EXHAUST FANS SHALL BE INSTALLED BUT NOT ELECTRICALLY CONNECTED AS PART OF THIS PROJECT.
9. FOR DEVICES "TO BE DEMOLISHED" REMOVE WIRING AND CONDUIT BACK TO PANEL OR DEVICE FROM WHICH DEMOLISHED DEVICE WAS BEING FED FROM. SEAL ANY OPEN CONDUIT KNOCKOUTS THAT REMAIN AS A RESULT OF CONDUIT REMOVAL.
10. SEE DWG. C3 FOR NEW FLOOR PLAN.
11. REPLACE EXISTING 30A, 480V, 3P NEMA1 DISCONNECT SWITCH WITH A NEW NEMA3R SWITCH AND EXISTING NEMA1 STARTER WITH A NEW SIZE 1, 480V, 3P, IN NEMA3R ENCLOSURE WITH 120V CONTROL CIRCUIT, COVER MOUNTED START/STOP PUSHBUTTONS AND INTEGRAL PHASE LOSS PROTECTION SIEMENS MODEL NO. SXLC2120AU1J.

LEGEND:

ON ALL SYMBOLS SUBSCRIPT:

"R" – INDICATES TO BE RELOCATED
"D" – INDICATES TO BE DEMOLISHED
"EX" – INDICATES EXISTING TO REMAIN
NO SUBSCRIPT INDICATES NEW

– EXISTING
– NEW
– DUPLEX RECEPTACLE, 20A, 120V, 5-20R (WP/GFI INDICATES WEATHERPROOF GROUND FAULT INTERRUPTER)
– TOGGLE SWITCH, 20A, 277V "4" INDICATES FOUR WAY
– DISCONNECT SWITCH, 30A, 600V, 3P
– MOTOR STARTER
– MOTOR (NO. INDICATES HORSEPOWER)
– SPECIAL PURPOSE RECEPTACLE 208V, 3 PHASE
– EXIT SIGN, GREEN, LED WITH BATTERY BACKUP LITHONIA MODEL LES1G 120/277ELN OR EQUAL
– EMERGENCY LIGHT WITH BATTERY BACKUP, LITHONIA MODEL 6ELM2 OR EQUAL
F1 – LIGHT FIXTURE – FLUORESCENT GASKETED STEM MOUNTED 15' AFF LITHONIA MODEL DMW 296H0T8AR277GEBIO OR EQUAL
F2 – LIGHT FIXTURE – 150W HPS WALL PAK MOUNTED APPROX. 8' AFF LITHONIA MODEL TWP 150S277PE OR EQUAL
F3 – DOWNLIGHT 70W/HPS MOUNTED IN OVERHANG LITHONIA MODEL LH70S277/RL-3 OR EQUAL
R F – FIRE ALARM MANUAL STATION (NON ADDRESSABLE)
– FIRE ALARM HEAT DETECTOR (ADDRESSABLE)
– FIRE ALARM HORN/STROBE
– FIRE ALARM WATER FLOW SWITCH
– FIRE ALARM TAMPER SWITCH
– GROUND ROD (3/4" X 10')
– LIGHTNING ARRESTOR
– PHOTOCELL (APPROX. 8' A.F.F.)

PANEL SCHEDULE – LP2 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
LIGHTING	2231			1	20	30	2	1000			RECEPTACLE B2
LIGHTING		1782		3	20	30	4		1000		
LIGHTING			3817	5	20	30	6			1000	
RECEPTACLE B1	1000			7	30	30	8	1000			RECEPTACLE B4
		1000		9	30	30	10		1000		
			1000	11	30	30	12			1000	
SPARE	1000			13	30	30	14	1000			RECEPTACLE B5
		1000		15	30	30	16		1000		
			1000	17	30	30	18			1000	
UH-3 (5KW)	6000			19	25	15	20	1859			AIR COMP.
UH-4 (5KW)		500		21	25	15	22		1859		
UH-5 (5KW)			5000	23	25	15	24			1859	
UH-6 (5KW)	5000			25	25	20	26	1760			LIGHTING
UH-7 (7.5KW)		7500		27	35	30	28		1000		SPARE
UH-8 (7.5KW)			7500	29	35	30	30			1000	
POWER CENTER(PC1)	6980			31	50	30	32	5000			DUCT HEATER FOR AHU #4 (15KW)
		6980		33	50	30	34		5000		
			6980	35	50	30	36			5000	
LIGHTING	1330			37	20	20	38	1330			AHU #4 (3HP)
LIGHTING		3520		39	20	20	40		1330		
SPARE				41	20	20	42			1330	
SUB-TOTAL				G — N							SUB-TOTAL

VOLTAGE: 480/277 3P.3L 4W. 60H MAIN BUS: 225 A — TOTAL WATTS, L1 36,460
MAIN BREAKER: 225 A. FRAME 175 A. TRIP — TOTAL WATTS, L2 34,481
MOUNTING: SURFACE — TOTAL WATTS, L3 35,486
NOTE: EXISTING

PANEL NO. LP2 — LOC. PREP. AREA

PANEL SCHEDULE – PC1 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
RECEPTACLES	720			1	20	20	2	720			RECEPTACLES
RECEPTACLES		720		3	20	20	4		720		RECEPTACLES
RECEPTACLES			360	5	20	20	6			540	RECEPTACLES
RECEPTACLES	540			7	20	30	8	1000			RECEPTACLE A2
RECEPTACLES (EDF)		500		9	20	30	10		1000		
CRANE (1/2 HP @ 120V)			1000	11	20	30	12			1000	
RECEPTACLE A1	1000			13	30	30	14	1000			RECEPTACLE A4
		1000		15	30	30	16		1000		
			1000	17	30	30	18			1000	
SPARE				19	30	30	20			1000	RECEPTACLE A5
				21	30	30	22	1000			
				23	30	30	24		1000		
SUB-TOTAL	3260	3260	3380							3720	3540 SUB-TOTAL

VOLTAGE: 208/120 3PH 4W 5H — MAIN BUS: SID. A — TOTAL WATTS L1 5980
MAIN BREAKER: 50 A. SECONDARY: 100 A. TRIP — TOTAL WATTS L2 5980
MOUNTING: SURFACE — TOTAL WATTS L3 5980
NOTE: POWER CENTER WITH 30KVA XFMR – EXISTING

PANEL NO. PC1 — LOC. PREP. AREA

PANEL SCHEDULE – LP1 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
SPARE				1	20	20	2				SPARE
LIGHTING		LBB		3	20	20	4		1701		LIGHTING
SPARE				5	20	20	6			2990	LIGHTING
LIGHTING	LBB			7	20	20	8	3305			LIGHTING
LIGHTING(OUTSIDE)	2,800			9	20	20	10		280		LIGHTING (SSB)
		LBB		11	30	40	12			LBB	
AHU #1	LBB			13	30	40	14	LBB			AHU #3
		LBB		15	30	40	16		LBB		
	LBB			17	30	30	18			5000	
AHU #2		LBB		19	30	30	20	5000			DUCT HEATER FOR AHU #5 (15KW)
			LBB	21	30	30	22		5000		
SPARE				23	20	30	24				SPARE
SEWER LIFT SYSTEM	14,850			25	100	20	26				SPARE
		14,850		27	100	20	28				SPARE
			14,850	29	100	20	30				SPARE
CHP-1 (2HP)	903			31	15	20	32	3000			WATER HEATER (9KW)
		903		33	15	20	34		3000		
			903	35	15	20	36			3000	
CHP-2 (2HP)	903			37	15	20	38	1330			AHU #5 (3HP)
		903		39	15	20	40		1330		
			903	41	15	20	42			1330	
SUB-TOTAL				G — N							SUB-TOTAL

VOLTAGE: 480/277 3P.3L 4W. 60H MAIN BUS: 400 A — TOTAL WATTS, L1 50,864
MAIN BREAKER: 300 A. FRAME 300 A. TRIP — TOTAL WATTS, L2 55,064
MOUNTING: SURFACE — TOTAL WATTS, L3 47,584
NOTE: EXISTING

PANEL NO. LP1 — LOC. ELECT. ROOM

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	

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JOHN C. STENNIS SPACE CENTER SSC, MS 39529-6000

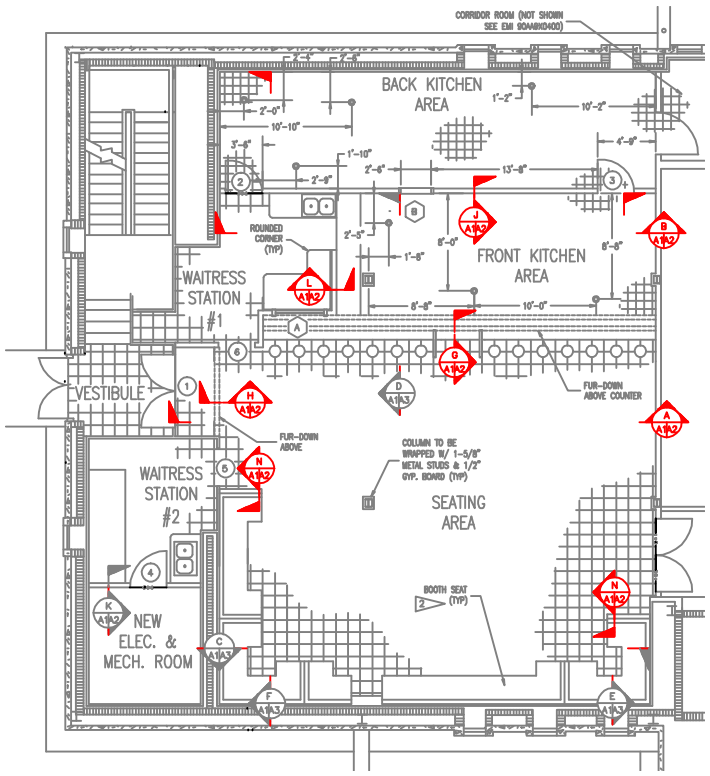
CONTRACTOR'S NAME

FIG. 20
SAMPLE DRAWING FOR SYMBOLS LEGEND

REF NO
SUBMITTED
NASA SAFETY
APPROVED DATE
USED ON

CADD CONTROLLED DRAWING
CADD P/N:

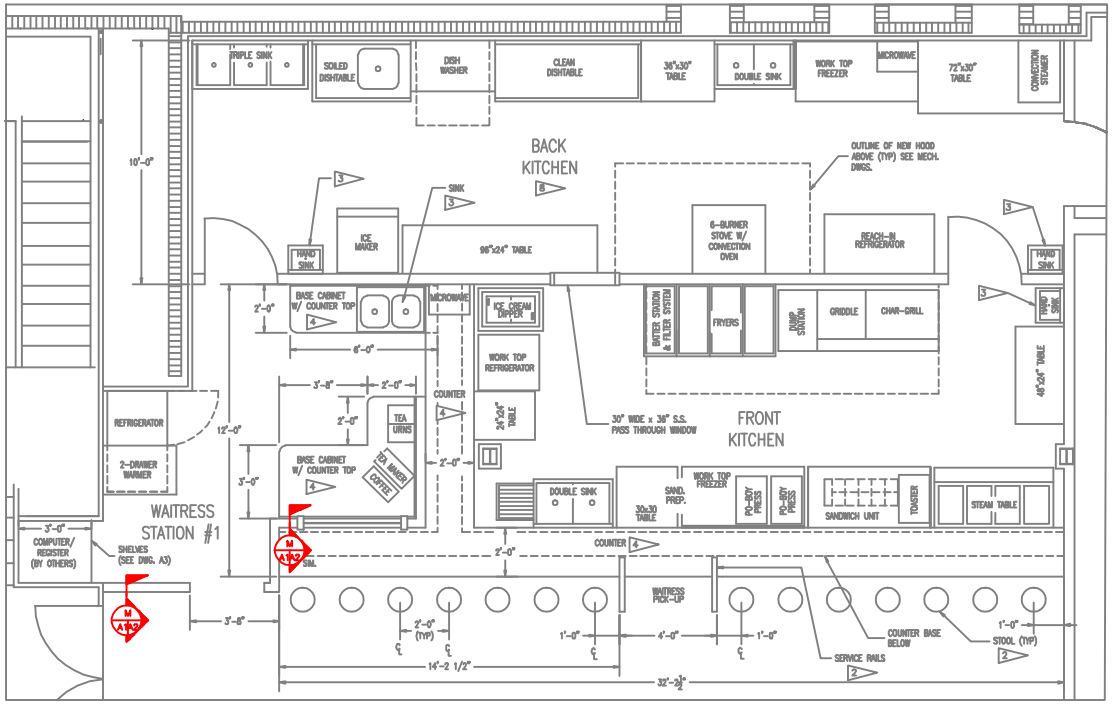
SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



NEW RESTAURANT FLOOR PLAN

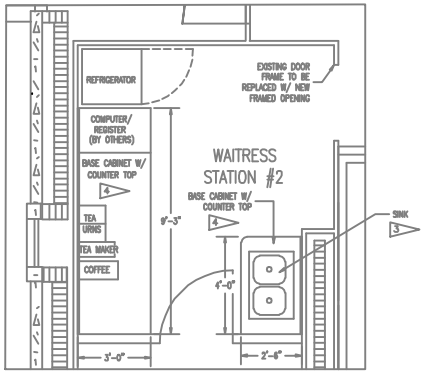
SCALE: 1/8" = 1'-0"

NOTE: MOVABLE EQUIPMENT, TABLES, AND CHAIRS NOT SHOWN FOR CLARITY.



ENLARGED KITCHEN AREA EQUIPMENT LAYOUT

SCALE: 1/4" = 1'-0"



ENLARGED WAITRESS AREA #2 EQUIPMENT LAYOUT

SCALE: 1/4" = 1'-0"

NOTES:

1. FIELD VERIFY ALL DIMENSIONS.
2. TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. HAND SINKS TO BE MODEL NO. HSA-10F AS MANUFACTURED BY EAGLE FOOD SERVICE EQUIPMENT OR APPROVED EQUAL. BUILT-IN 2-COMPARTMENT SINKS TO BE McMASTER-CARR ITEM #3640K12 OR APPROVED EQUAL.
4. BASE CABINETS FOR WAITRESS STATION AREAS MAY BE CONSTRUCTED IN SEPARATE UNITS THAT FIT TOGETHER TO MAKE THE OVERALL REQUIRED LENGTH SHOWN ON THE FLOOR PLAN. NO DOORS ARE REQUIRED. THE COUNTER TOPS FOR THE BASE CABINETS SHALL HAVE A BACKSPLASH. THE COUNTER TOP FOR THE "COUNTER" SHALL BE 24" AND HAVE SQUARED EDGES (NO BACK SPLASH). ONE EDGE SHALL BE LAMINATED, WHILE THE EDGE EXPOSED TO THE SEATING AREA SHALL BE COVERED WITH 1 1/4" ALUMINUM FLUTED MOLDING. SEE DWG. A4 FOR DETAILS.
5. A 1"x6" (APPROX.) PIECE OF WOOD MOLDING SHALL BE INSTALLED CONTINUOUSLY AROUND THE PERIMETER OF THE SEATING AREA. THE BOTTOM OF THE MOULDING SHALL BE AT THE SAME ELEVATION AS THE BOTTOM OF THE JOISTS (10'-6" A.F.F.). THE MOLDING AND EVERYTHING ABOVE (INCLUDING JOISTS, BEAMS, METAL DECK, CONDUIT, WIRING, ETC.), EXCEPT DUCTWORK, SHALL BE PAINTED BLACK (MATTE FINISH). ALL DUCTWORK SHALL BE PAINTED RED.
6. ALL EXISTING WALLS IN SEATING AREA THAT ARE NOT CONTINUOUS UP TO THE BOTTOM OF THE 2ND FLOOR METAL DECK SHALL BE EXTENDED. METAL STUDS SHALL BE ADDED TO EXTEND THE WALLS TO MEET THE BOTTOM OF THE 2ND FLOOR METAL DECK. NEW 3/8" GYP. BD. SHALL BE INSTALLED, TAPED, AND FLOATED ON ALL EXISTING WALLS (EXCEPT WALL SEPARATING THE GIFT SHOP FROM THE RESTAURANT) IN THE SEATING AREA. GYP. BD. BEHIND BOOTHS DOES NOT NEED TO BE FINISHED.
7. ALL NEW WALLS IN SEATING AREA SHALL EXTEND TO MEET THE BOTTOM OF THE 2ND FLOOR METAL DECK. GYP. BD. BEHIND 3" DIAMOND EMBOSSED STAINLESS STEEL OR FIBERGLASS WALLBOARD DOES NOT NEED TO BE FINISHED.
8. FIBERGLASS WALLBOARDS SHALL BE APPLIED ON ALL EXPOSED WALLS IN BACK KITCHEN AREA.
9. UNLESS NOTED OTHERWISE, ALL EXPOSED GYP. BD. IN SEATING AREA SHALL BE PAINTED WHITE.
10. THE COLOR "RED" USED FOR ANY ITEMS SPECIFIED TO BE PAINTED RED, LIGHTING FIXTURES WITH RED FINISH, OR CERAMIC WALL TILE TO BE RED, SHALL BE CLOSELY COORDINATED WITH THE COLOR OF THE VINYL BOOTHS AND CHAIRS.

LEGEND:

- EXISTING
- NEW
- NEW INTERIOR WALL
- SEPARATION OF DIFFERENT FLOOR FINISHES
- DOOR NO. (SEE OPENING SCHEDULE DWG. A4)
- WINDOW DESIGNATION (SEE OPENING SCHEDULE DWG. A4)
- FLOOR DRAIN
- 12"x12" VINYL FLOOR TILES
- 8"x8" QUARRY FLOOR TILES

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

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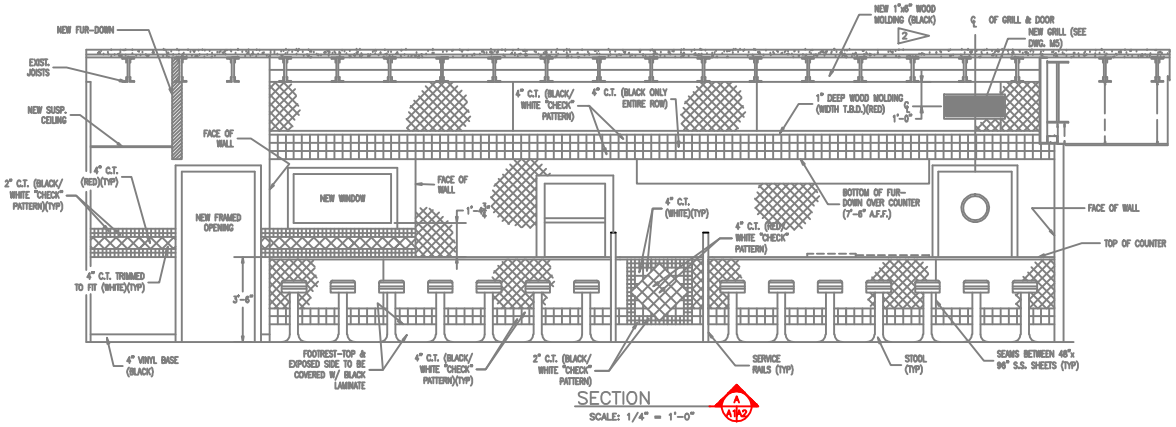
CADD P/N:

CONTRACTOR'S NAME

FIG. 21
SAMPLE DRAWING FOR SECTION CUTS (TAKEN FROM)

SIZE F | DWG NO. | REV

AUTHORITY | SHEET



SECTION
SCALE: 1/4" = 1'-0"

NOTES:

1. EXISTING STRUCTURAL MEMBERS PRIMED W/ "ORANGE" PAINT CONTAIN LEAD PAINT. PROPER PRECAUTIONS SHALL BE TAKEN TO ELIMINATE ANY DISTURBANCE OF THE LEAD PAINT.

2. A 1"x6" (APPROX.) PIECE OF WOOD MOLDING SHALL BE INSTALLED CONTINUOUSLY AROUND THE PERIMETER OF THE SEATING AREA. THE BOTTOM OF THE MOLDING SHALL BE AT THE SAME ELEVATION AS THE BOTTOM OF THE JOISTS (10'-0" A.F.F.). THE MOLDING AND EVERYTHING ABOVE (INCLUDING JOISTS, BEAMS, METAL DECK, CONDUIT, WIRING, ETC.), EXCEPT DUCTWORK SHALL BE PAINTED RED.

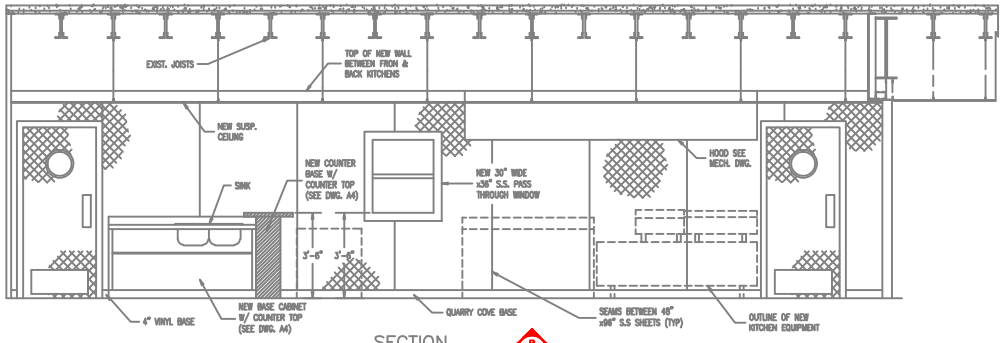
3. BRACE AS REQUIRED TO NEAREST "NON-LEAD PAINTED" MEMBER.

LEGEND:

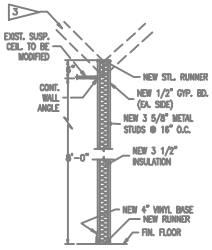
EXISTING
NEW

C.T.	CERAMIC TILE
S.S.	STAINLESS STEEL
T.B.D.	TO BE DETERMINED
A.F.F.	ABOVE FINISH FLOOR

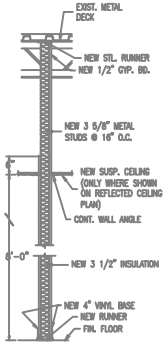
3" DIAMOND EMBOSSED STAINLESS STEEL PLATE



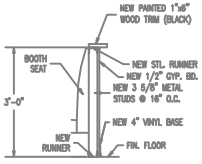
SECTION
SCALE: 1/4" = 1'-0"



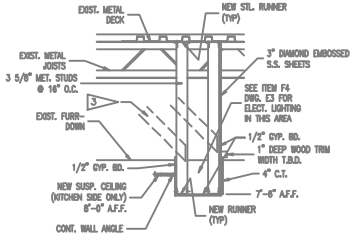
SECTION
SCALE: 3/4" = 1'-0"



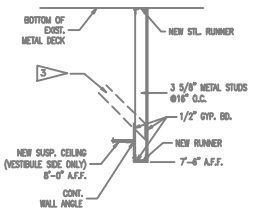
SECTION
SCALE: 3/4" = 1'-0"



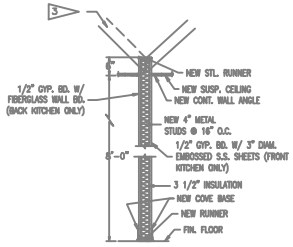
SECTION
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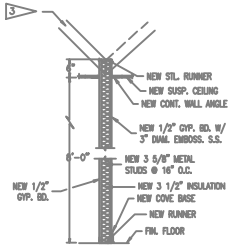
SECTION
SCALE: 3/4" = 1'-0"



SECTION
SCALE: 3/4" = 1'-0"



SECTION
SCALE: 3/4" = 1'-0"



SECTION
SCALE: 3/4" = 1'-0"

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
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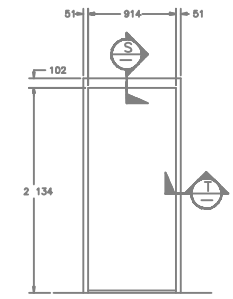
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BSD, MS 39529-6000

CONTRACTOR'S NAME

FIG. 22
SAMPLE DRAWING FOR SECTION CUTS (APPEARS ON)

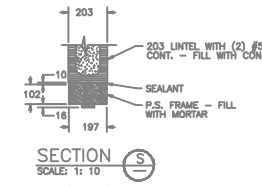
SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



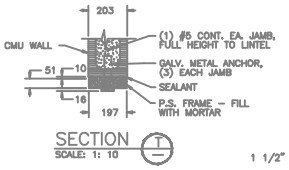
HOLLOW METAL DOOR

DOOR ELEVATION

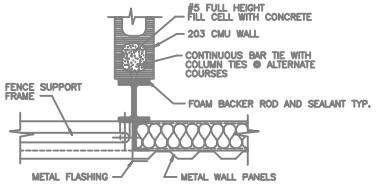
NOT TO SCALE



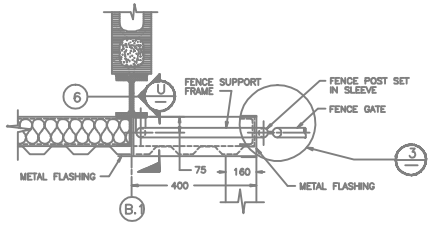
SECTION S
SCALE: 1: 10



SECTION T
SCALE: 1: 10



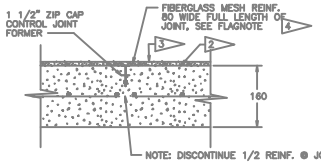
DETAIL 1
SCALE: 1: 10



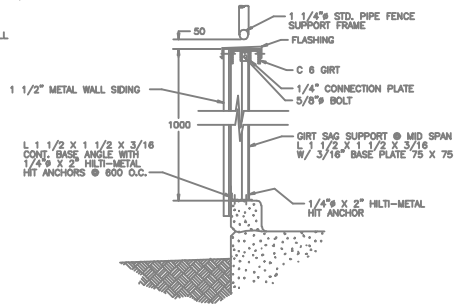
DETAIL 2
SCALE: 1:10

NOTES:

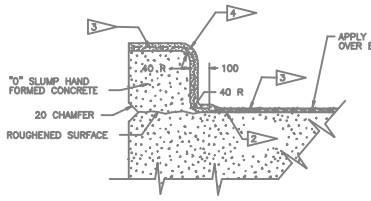
1. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PREPARE CONCRETE BY USING "SHOT BLAST" METHOD OR OTHER APPROVED METHOD FOR VERTICAL APPLICATIONS AS RECOMMENDED BY THE MFGR. TO PROVIDE 10–12 MIL. SURFACE PROFILE.
3. COATING SYSTEM SHALL CONSIST OF 4 COATS AS FOLLOWS:
   (A) FIRST COAT OF DUR-A-GLAZE #4 CR-1 100% SOLIDS EPOXY SHALL BE APPLIED TO A MINIMUM THICKNESS OF 10 MILS.
   (B) ALUMINUM OXIDE SHALL BE BROADCAST UNIFORMLY FOR TRACTION.
   (C) SECOND COAT OF DUR-A-GLAZE #4 CR-1 SHALL BE APPLIED TO A MINIMUM THICKNESS OF 10 MILS.
   (D) TWO COATS OF CLEAR POLYTHANE SHALL BE APPLIED PER MFGR. RECOMMENDATIONS.
4. FIBERGLASS MESH REINFORCEMENT PLACED AFTER FIRST COAT OF DUR-A-GLAZE #4 CR-1 HAS BEEN APPLIED PER MFGR. RECOMMENDATIONS. OMIT ALUMINUM OXIDE FOR VERTICAL APPLICATIONS.



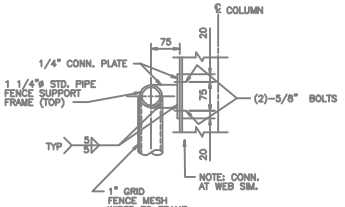
SECTION V
SCALE: 1: 5



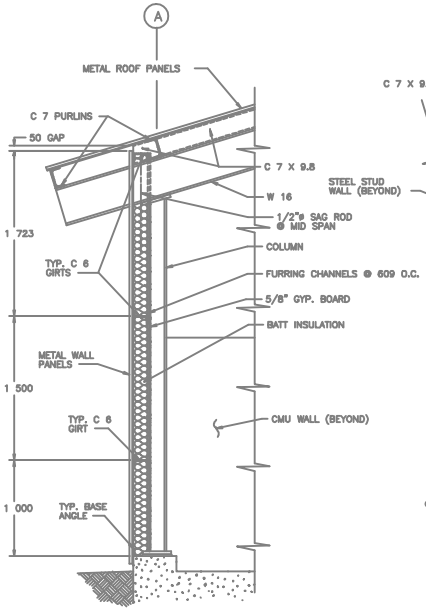
SECTION L
SCALE: 1: 10



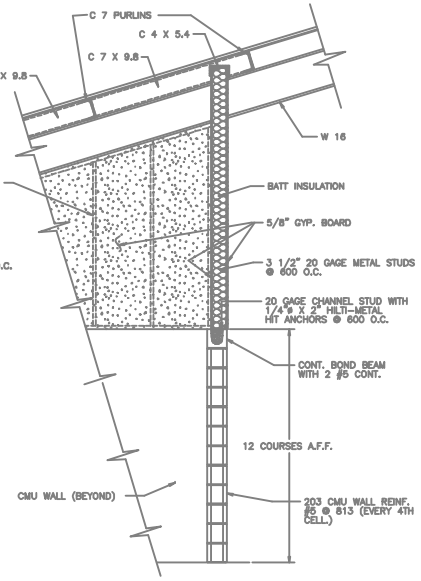
SECTION W
SCALE: 1: 5



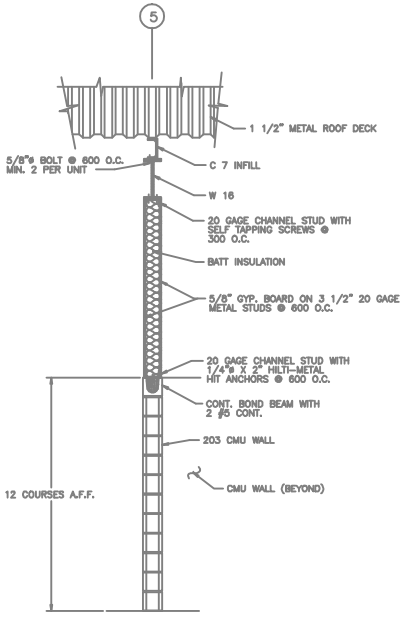
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SCALE: 1: 5



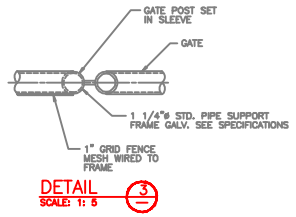
SECTION H
SCALE: 1: 20



SECTION J
SCALE: 1: 20



SECTION K
SCALE: 1 – 20



DETAIL 3
SCALE: 1: 5

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
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CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
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APPROVED	DATE
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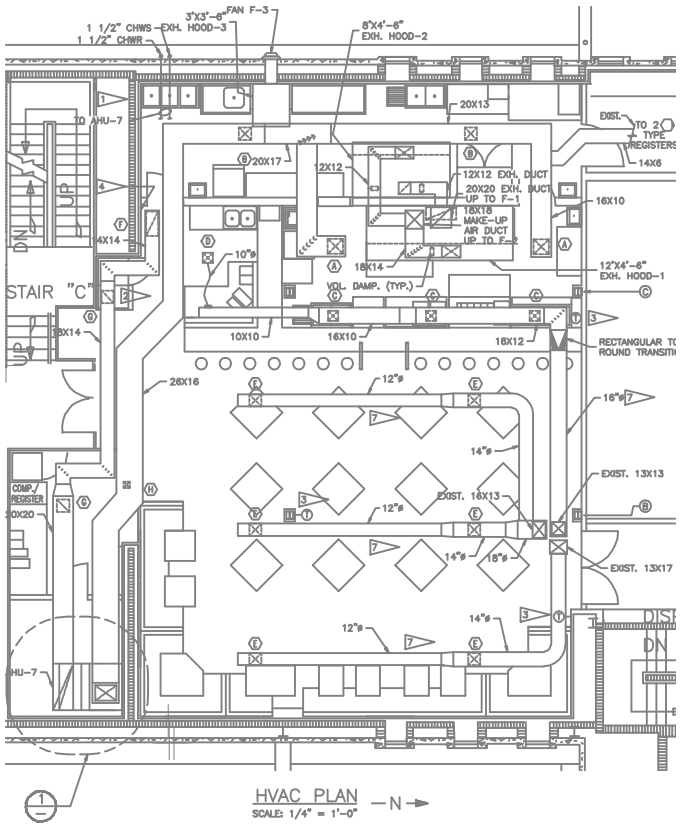
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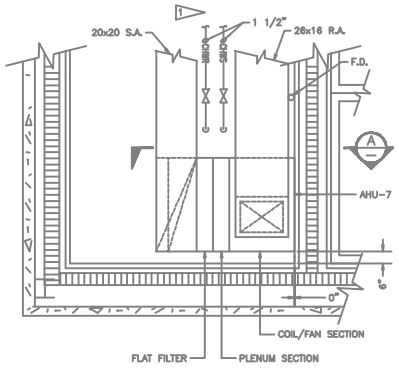
CONTRACTOR'S NAME

FIG. 23
SAMPLE DRAWING FOR DETAIL IDENTIFICATIONS

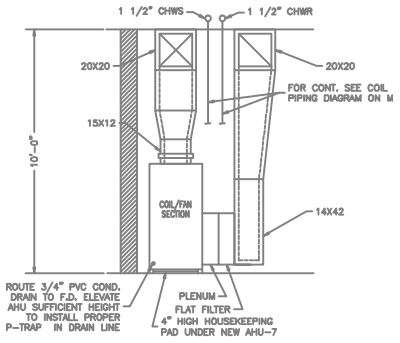
SIZE F | DWG NO. | REV

AUTHORITY | SHEET





DETAIL 1
SCALE: 1/2"=1'-0"



SECTION A
SCALE: 1/2"=1'-0"

AIR HANDLING UNIT SCHEDULE

UNIT DESIGNATION	FAN SECTION				ELECTRICAL			COOLING SECTION							NOTES
	SUPPLY AIR (CFM)	EXT. SP (IN. H20)	MIN. O.A. (CFM)	MIN. MOTOR (HP)	VOLTS	Hz	PHASE	TOTAL CAPACITY (BTUH)	SENSIBLE CAPACITY (BTUH)	ENT AIR (°F) DB	ENT AIR (°F) WB	LVG AIR (°F) DB	LVG AIR (°F) WB	WATER FLOW RATE (@4.4°F) (GPM)	MAX. WATER PRESSURE DROP(FT. H20)	
AHU-7	2,600	0.6	-	3	480	60	3ø	78,000	67,000	76.0	65.0	54.0	53.0	16	10	①②③④⑤⑥⑦

① FAN AND MOTOR SHALL BE INTERNALLY SPRING ISOLATED AND FAN DISCHARGE SHALL HAVE INTERNAL FLEX CONNECTOR.

② DOUBLE-WALL CONSTRUCTION.

③ PROVIDE WITH IAQ STAINLESS STEEL SLOPED DRAIN PAN.

④ MAX. COIL FACE VELOCITY: 2.5 M/S.

⑤ REPLACE VARIABLE PITCH SHEAVE USED FOR BALANCING WITH A PROPERLY SIZED FIXED SHEAVE AFTER COMPLETION OF AIR BALANCING.

⑥ PIPE COILS AS SHOWN ON DWG. M4.

⑦ SELECTION BASED ON CARRIER MODEL 39LD AIR HANDLER. CAPABLE OF 3,200 CFM@ 2.5" T.S.P.

REGISTER/GRILLE SCHEDULE

MARK	TYPE	SIZE	CFM	REMARKS	NOTES ③
A	SUPPLY REGISTER	15X15	600	2-WAY (CORNER)	①
B	SUPPLY REGISTER	12X12	450	4-WAY	①
C	SUPPLY REGISTER	10X10	300	2-WAY (OPPOSITE)	①
D	SUPPLY REGISTER	10X10	300	4-WAY	①
E	SUPPLY REGISTER	12X12	450	4-WAY	②
F	RETURN REGISTER	12X24	1000	---	①
G	RETURN REGISTER	12X12	500	---	①
H	SUPPLY REGISTER	6X6	200	1-WAY	①
I	SUPPLY REGISTER	-	150	EXISTING	-

① MOUNTED IN CEILING.

② MOUNTED ON EXPOSED ROUND DUCT.

③ SUPPLY REGISTERS - METALAIRE SERIES 5000 WITH O/B DAMPER; RETURN REGISTERS - METALAIRE SERIES 7000R W/ DAMPERS.

PUMP SCHEDULE

DESIGNATION	SYSTEM TYPE	GPM	TDH FT H20	MIN EFF	MOTOR HP	MOTOR RPM	MOTOR ELECT	REMARKS
CHWP-1	CHILLED WATER	122	90	63%	7 1/2	1750	480/3ø	①

① REPLACES EXISTING PUMP.

FAN SCHEDULE

MARK	TYPE	CFM	T.S.P.	RPM	H.P.	ELECT.	NOTES
F-1	KITCHEN EXHAUST	4,380	0.80"	900	1 1/2	480/3ø	①
F-2	KITCHEN MAKE-UP	3,100	0.65"	600	1	480/3ø	②
F-3	DISHWASHER EXHAUST	560	0.125"	880	1/20	120/1ø	③

① GREENHECK MODEL CUBE-220HP-15, OR APPROVED EQUAL

② GREENHECK MODEL KSU-115-D-2-10 (ARRANGEMENT A) W/ ROOF CURB, OR APPROVED EQUAL

③ GREENHECK MODEL GW-100-C, OR APPROVED EQUAL

EXHAUST HOOD SCHEDULE

MARK	TYPE EXH.	SIZE	EXH. CFM	MAKE-UP CFM	FILTERS	NOTES
1	FRYERS/CHARBROILER	12'X4'-6"	2,880	2,100	4-20"X20"X2"	①
2	STOVE	8'X4'-6"	1,400	1,000	3-20"X20"X2"	①
3	DISHWASHER	3'X3'-6"	560	---	---	---

① GREENHECK MODEL GHAW, WITH LIGHTS AND FIRE SUPPRESSION SYSTEM, OR APPROVED EQUAL

NOTES:

1. ROUTE CHWS/R PIPING IN JOIST AREA AT HIGHEST ELEVATION POSSIBLE TO ALLOW MAXIMUM CLEARANCE FOR DUCTWORK.
2. COORDINATE LOCATION OF CHWS/R LINES, DUCTWORK, & DOMESTIC WATERLINES AT COLUMN LINE C (REDUCTION IN CEILING CAVITY CLEARANCE).
3. REINSTALL EXISTING THERMOSTATS TO LOCATION INDICATED.
4. LOCATION OF NEW EMCS POINTS ⑦ & ⑧ .
5. DUCT DIMENSIONS ARE INSIDE CLEAR. INSULATE W/ 1" THICK INSULATION.
6. INSULATE KITCHEN MAKE-UP AIR DUCT W/ 1" THICK INSULATION.
7. ROUND DOUBLE WALL DUCT. SEE SPEC. FOR DESCRIPTION. ROUTE DUCT BETWEEN JOIST AT HIGHEST ELEVATION POSSIBLE.

LEGEND:

SEE DWG. M1 FOR LEGEND.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	
USED ON	

REF NO

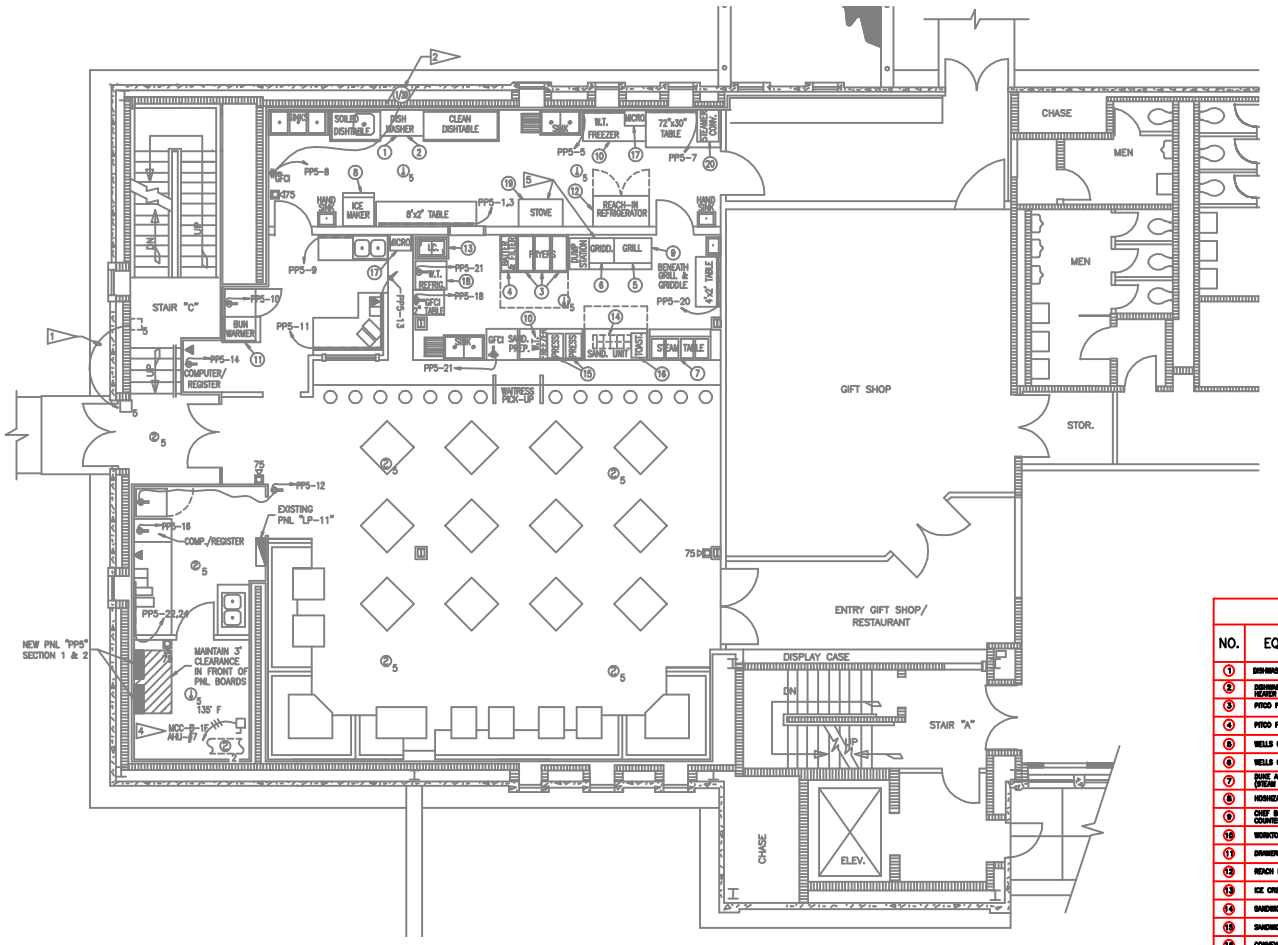
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FIG. 24
SAMPLE DRAWING FOR SCHEDULES (HVAC)

SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



POWER PLAN – KITCHEN AREA —N→

SCALE: 1/4" = 1'-0"

NOTES:

1. RELOCATE EXISTING PULL STATION AS SHOWN. EXTEND DETECTION CIRCUIT TO NEW DETECTION DEVICES. MAINTAIN SUPERVISION AND INTEGRITY OF EXISTING CIRCUITS.
2. EXTEND CIRCUIT PP5-8 TO DISHWASHER HOOD FAN MOTOR. START/STOP CONTROL SHALL BE PROVIDED BY MECHANICAL, INSTALLED BY ELECTRICAL.
3. SEE DWG. E1 FOR GENERAL NOTES.
4. RUN 3#12 AWG IN 3/4" EMT TO MCC-B-1F. EXTEND TO EQUIPMENT USING FLEXIBLE METAL CONDUIT. DISCONNECT SWITCH SHALL BE FIELD LOCATED TO COMPLY WITH NEC MANDATED CLEARANCES.
5. HOOD FIRE EXTINGUISHERS SHALL BE WIRED TO ZONE 5 OF FIRE ALARM SYSTEM. EXTEND 120V FROM NEAREST LIGHTING CIRCUIT TO EACH HOOD FOR HOOD LIGHTS.

LEGEND:

SEE DWG. E1 FOR LEGEND.

EQUIPMENT SCHEDULE

NO.	EQUIPMENT	ELECTRICAL REQUIREMENTS	FEEDER	ROUTING	TERMINATION	PANEL & CIRCUIT NO.
①	DISHWASHER	208 VOLT, 3 PHASE, 40 AMP	3 #8 AWG, 1 #8 AWG(G) IN 1" C	OVERHEAD	DIRECT CONNECTION, USE 1 1/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 60,62,64
②	DISHWASHER BOOSTER WATER HEATER	208 VOLT, 3 PHASE, 45 AMP	3 #8 AWG, 1 #8 AWG(G) IN 1" C	OVERHEAD	DIRECT CONNECTION, USE 1" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 74,76,78
③	PITCO FRYALATOR	208 VOLT, 3 PHASE, 60 AMP	3 #6 AWG, 1 #6 AWG(G) IN 1" C	OVERHEAD	DIRECT CONNECTION, USE 1" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 56,58,60, 62,64,66,68,70,72
④	PITCO FRYALATOR FILTER	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	DIRECT CONNECTION, USE 3/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 33
⑤	WELLS CHAR-BROILER	208 VOLT, 3 PHASE, 40 AMP	3 #8 AWG, 1 #8 AWG(G) IN 1" C	OVERHEAD	DIRECT CONNECTION, USE 1" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 50,52,54
⑥	WELLS GRIDDLE	208 VOLT, 3 PHASE, 60 AMP	3 #6 AWG, 1 #6 AWG(G) IN 1 1/2" C	OVERHEAD	DIRECT CONNECTION, USE 1 1/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 44,46,48
⑦	BUNN AEROHOT WARMER (STEAM TABLE)	208 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	UNDER FLOOR *	NEMA 6-20 RECEPTACLE	PP5 – 65,65
⑧	HOSHIZAKI ICE MAKER	208 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	DIRECT CONNECTION, USE 3/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 35,37
⑨	CHEF BASE (UNDER COUNTER REFRIGERATOR)	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 6
⑩	WORKTOP UNIT FREEZER	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 23,25
⑪	DRAWER WARMER	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 2
⑫	REACH IN REFRIGERATOR	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 10
⑬	ICE CREAM FREEZER	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 31
⑭	SANDWICH/SALAD UNIT	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	UNDER FLOOR *	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 29
⑮	SANDWICH GRILL	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	UNDER FLOOR *	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 37,39
⑯	CONVEYOR TOASTER	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	UNDER FLOOR *	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 27
⑰	MICROWAVE	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 15,17
⑱	WORKTOP UNIT REFRIGERATOR	120 VOLT, SINGLE PHASE, 20 AMP	2 #12 AWG, 1 #12 AWG(G) IN 3/4" C	OVERHEAD	STANDARD DUPLEX RECEPTACLE, 20 AMP	PP5 – 21
⑲	STOVE, CONVECTION OVEN	208 VOLT, 3 PHASE, 90 AMP	3 #1 AWG, 1 #1 AWG(G) IN 1 1/2" C	OVERHEAD	DIRECT CONNECTION, USE 1 1/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 49,51,53
⑳	GREEN STEAMER	208 VOLT, 3 PHASE, 30 AMP	3 #10 AWG, 1 #10 AWG(G) IN 1" C	OVERHEAD	DIRECT CONNECTION, USE 3/4" LIQUID TIGHT FLEXIBLE METAL CONDUIT	PP5 – 43,45,47

* – CONTRACTOR SHALL CORE DRILL A HOLE THRU THE FLOOR AND SUB FLOOR SIZED TO ACCOMODATE THE FEEDER

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
REF NO	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

CADD CONTROLLED DRAWING
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FIG. 25
SAMPLE DRAWING FOR SCHEDULES (ELECTRICAL)

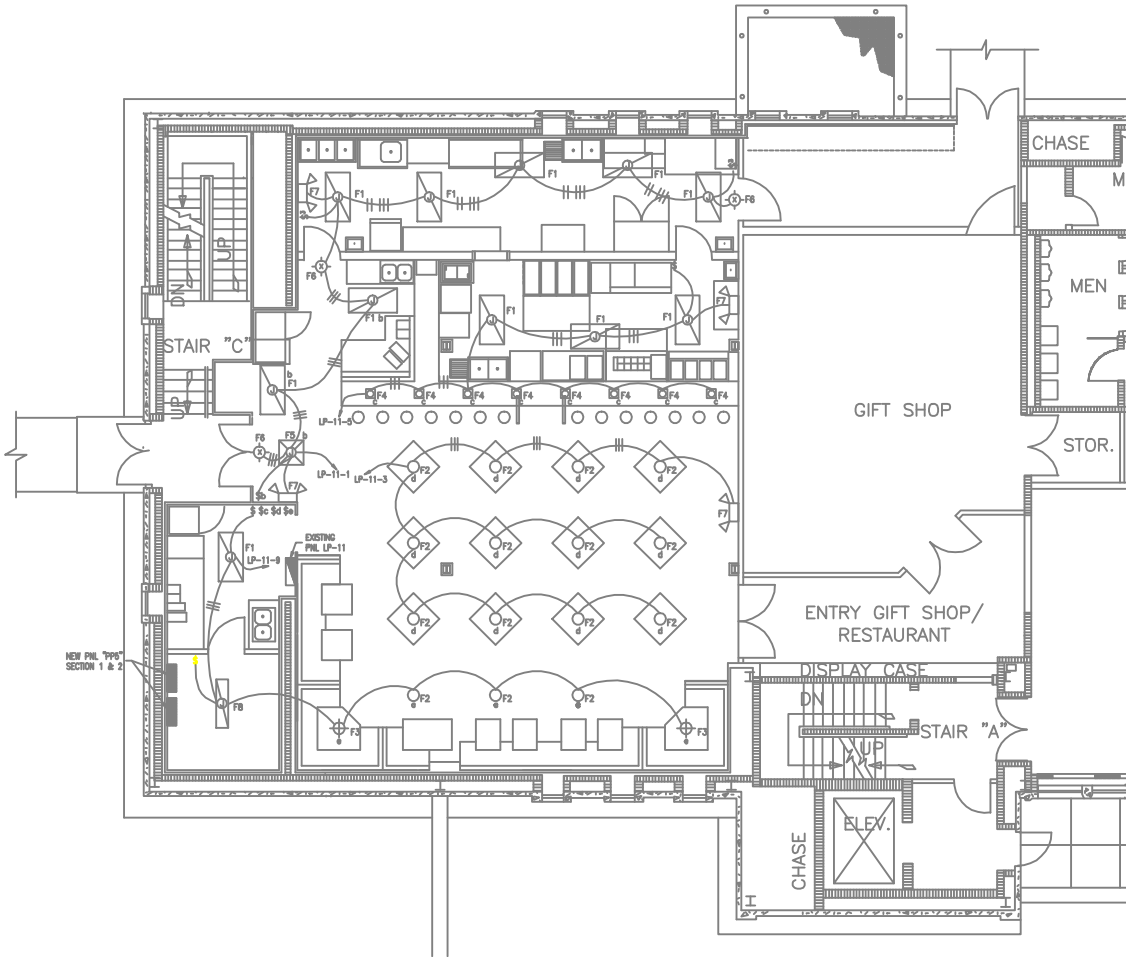
SIZE D | DWG NO. | REV
AUTHORITY | SHEET

LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER & CAT. NO.	LAMP TYPE	NOTES
F1	2X4 4 LAMP LAY IN TROFFER	LITHONIA 2GT 4 32 A12 120 1/4 GEB	4-F032/3K	1,4
F2	PENDANT MOUNTED DOME FIXTURE	ABOLITE RD200100MPGAL/RB100MH120 BLK	1-100W MH	1,2,3,5
F3	PENDANT MOUNTED DOME FIXTURE	ABOLITE BD200320PL120GRD/SMB32PL120 BLK	1-100W MH	1,2,3,5
F4	RECESSED COMPACT FLUORESCENT	LITHONIA AFV 32RT 5MB 120	1-32W	1
F5	2X2 LAY IN TROFFER	LITHONIA 2SPQ2LU316 A12 120 GEB	FBD31/3K	1,4
F6	EXIT SIGN, BATTERY BACKUP	LITHONIA LQM S 1 G 120 EL N	LED	1
F7	WALL MOUNTED EMERGENCY FLOODLIGHT	LITHONIA ELM2 BH	8W HALOGEN	1
F8	1X4 INDUSTRIAL TROFFER	LITHONIA L232 120 GEB	2-F032	1

NOTES:

1. OR APPROVED EQUAL
2. REMOTE BALLAST REQUIRED, NOT MORE THAN 20' FROM FIXTURE.
3. PROVIDE 3/4" MOUNTING STEM, PAINTED BLACK. LENGTH SHALL BE AS REQUIRED FOR MOUNTING 8' AFF.
4. SEE DRAWING A3 FOR CEILING GRID.
5. SEE NOTE 10 ON DWG. A1 FOR COLOR COORDINATION.



NEW RESTAURANT & GIFT SHOP ELECTRICAL LIGHTING PLAN —N→

SCALE: 1/4" = 1'-0"

DIRECTORY	WATTS LOAD A	B	C	CKT. NO.	BRK. AMPS	A B C	BRK. AMPS	CKT. NO.	WATTS LOAD A	B	C	DIRECTORY
LIGHTS, KITCHEN	800			1	20		20	2	1400			LIGHTS ON N. END
LIGHTS, DINING AREA		1440		3	20		20	4		1400		RM. 108 (ASBESTOS SIDE)
LIGHTS, KITCHEN			1200	5	20		20	6				SPARE
RM. 108	–			7	20		20	8				SPARE
LTS. DINING AREA, OFFICE		800		9	20		20	10				SPARE
SPARE				11	20		20	12				SPARE
SPARE				13	20		20	14				SPARE
SPARE				15	20		20	16				SPARE
SPARE				17	20		20	18				SPARE
SPARE				19	20		20	20				SPARE
SPARE				21	20		20	22				SPARE
SPARE				23	20		20	24				SPARE
SPARE				25	20		20	26	600			STAIRWELL & EXIT LGT.
SPARE				27	20		20	28				SPARE
SPARE				29	20		20	30				SPARE
SUB – TOTAL →	800	2240	1200			G — N			2000	1400	–	← SUB – TOTAL

VOLTAGE: 120/208 3PH 4W SN | MAIN BUS: 100 A | TOTAL WATTS A 2800 | TOTAL WATTS B 3640 | TOTAL WATTS C 1200 | TOTAL WATTS 7640

MAIN BREAKER: A. FRAME A. TRIP

MOUNTING: SURFACE

NOTE: EXISTING PANEL, FED FROM PANEL PP-1, BASEMENT

PANEL NO. (EXISTING) LP-11

LOC. RM. 108

LEGEND

SEE DWG. E1 FOR LEGEND.

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

SIGNATURES | DATE

DRAWN
CHECKED
ENGINEER
ISSUED
SUBMITTED
NASA SAFETY
APPROVED
USED ON

REF NO

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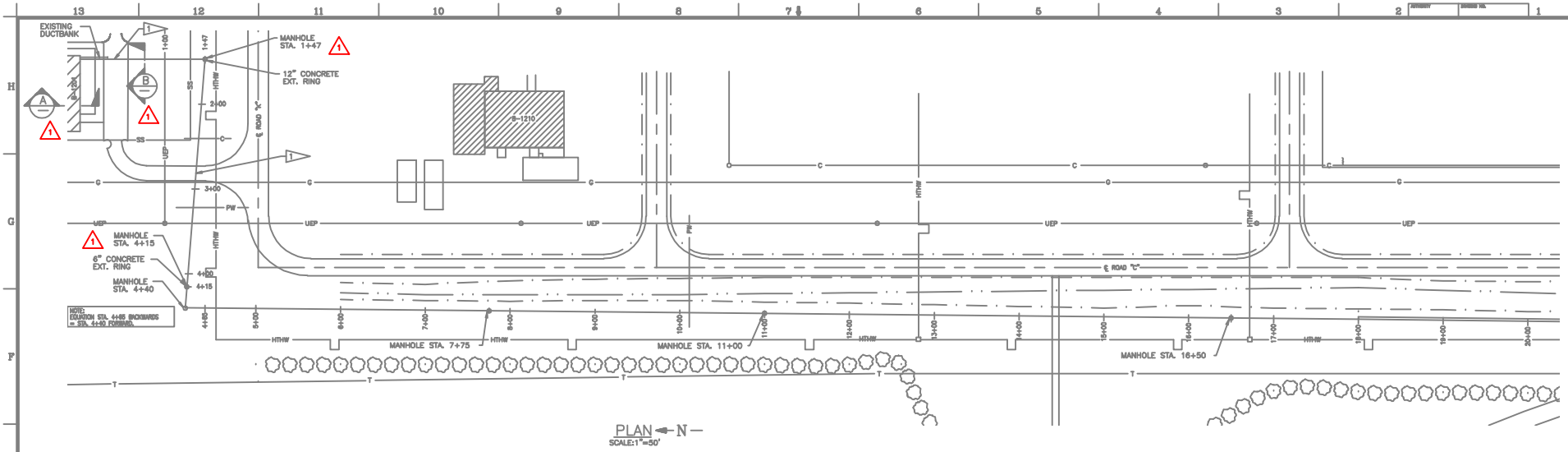
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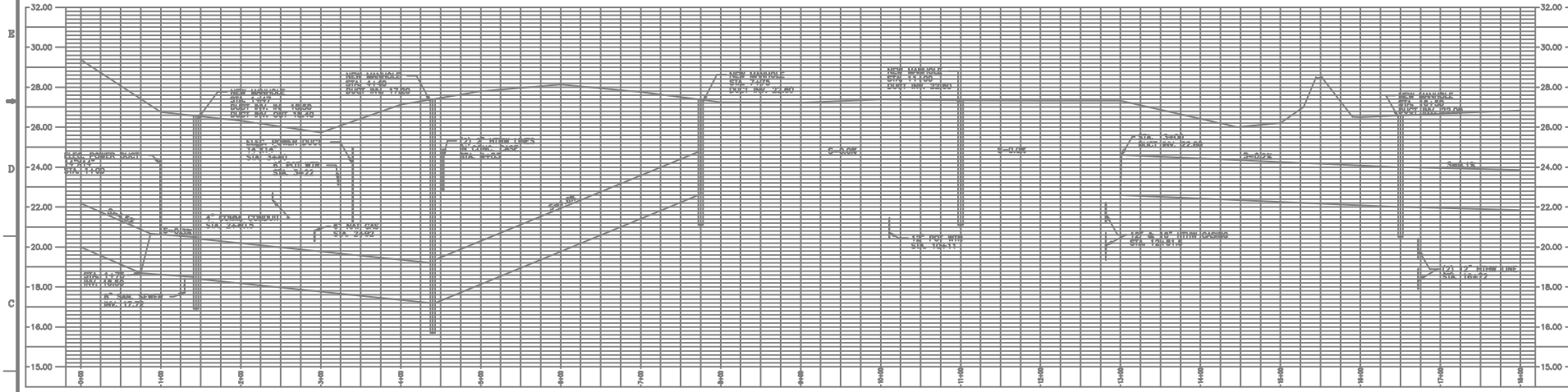
FIG. 26
SAMPLE DRAWING FOR SCHEDULES (ELECTRICAL)

SIZE F | DWG NO. | REV.

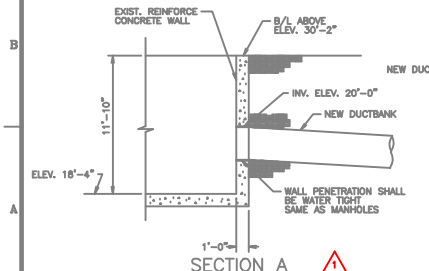
AUTHORITY | SHEET



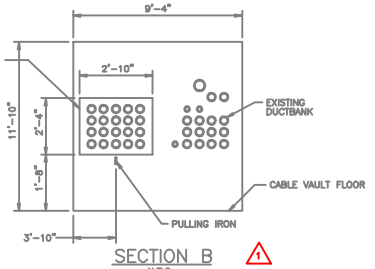
PLAN ◄ N ►
SCALE:1"=50'



PROFILE
HORIZONTAL SCALE:1"=50'
VERTICAL SCALE:1/2"=1'-0"



SECTION A
N.T.S.



SECTION B
N.T.S.

LEGEND: TYPICAL DOCUMENTS 3,4,5

C	EXISTING COMMUNICATIONS DUCT
G	EXISTING GAS LINE
T	EXISTING UNDERGROUND TELEPHONE LINE
SS	EXISTING SANITARY SEWER LINE
GN	EXISTING GASEOUS NITROGEN LINE
RP-1	EXISTING ROCKET PROPELLANT LINE
PW	EXISTING POTABLE WATER LINE
UEP	EXISTING UNDERGROUND ELECTRICAL POWER
HTHW	EXISTING HIGH TEMPERATURE HOT WATER LINE
O/H E	EXISTING OVER-HEAD ELECTRICAL LINE
	CENTERLINE OF EXISTING DITCH
	TOP OF EXISTING DITCH BANK

NOTES:
1. PAVED AREAS SHALL BE RESTORED TO ORIGINAL CONDITION.
2. INSTALL SPACERS TO HOLD UP THE 4" CONDUIT FROM SAGGING AND PULLING APART AS REQUIRED.

NOTE
FOR BID ITEM WORK CONTENT SEE DOC #1

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

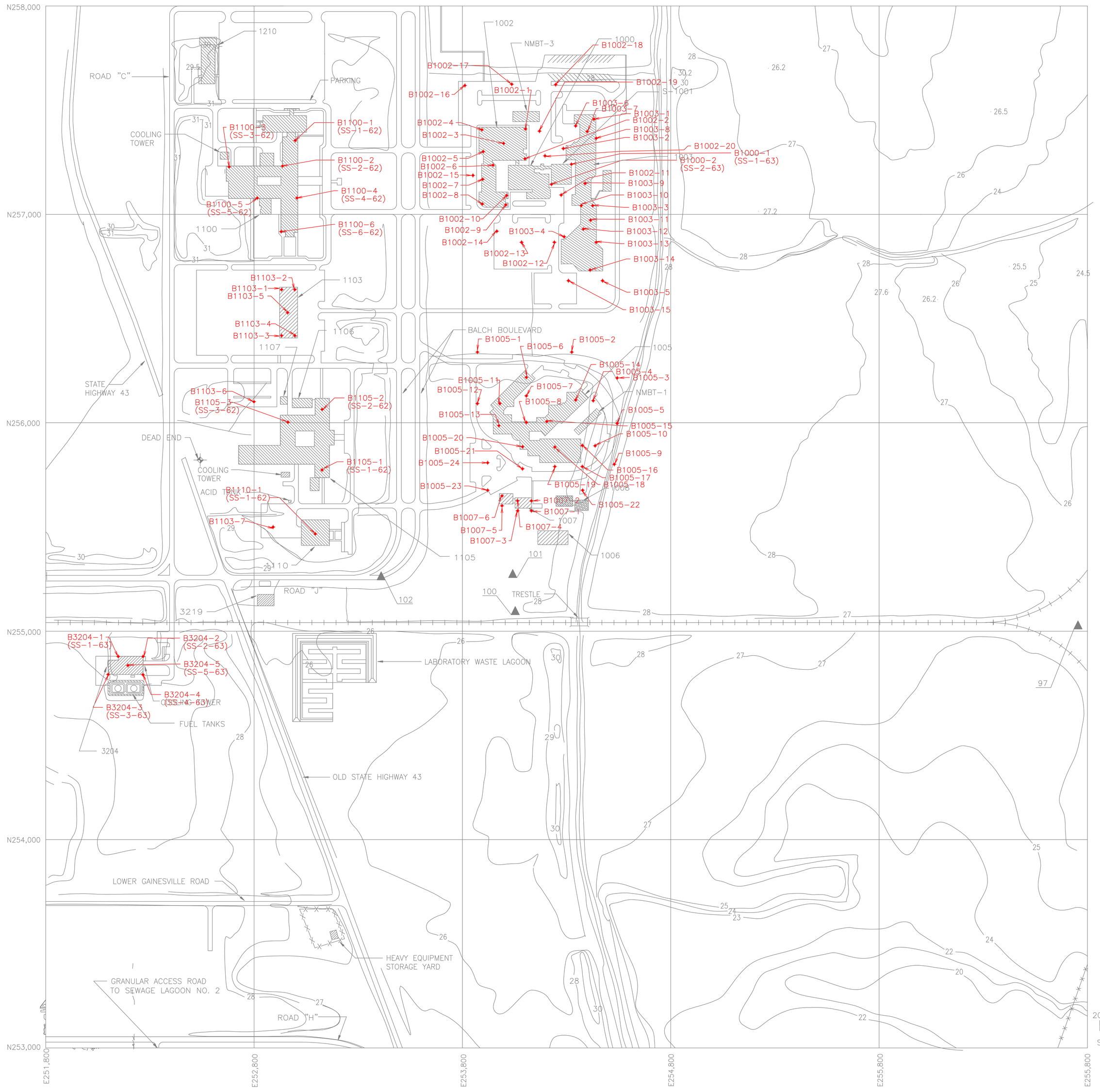
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NASA SAFETY	
APPROVED	DATE
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FIG. 27
SAMPLE DRAWING FOR REVISION

REF ND
CADD CONTROLLED DRAWING
CADD P/Nr
SIZE F | DWG NO. | REV 1
AUTHORITY | SHEET



BORING LOCATION CHART

BORING NO.	REFERENCE DRAWING. NO.
B1000-1 THRU B1000-2	MTF-2524
B1002-1 THRU B1002-20	NAVFAC NO. 5044749
B1003-1 THRU B1003-15	NAVFAC NO. 5106014
B1005-1 THRU B1005-24	NAVFAC NO. 5089433
B1007-1 THRU B1007-6	NAVFAC NO. 5171990
B1100-1 THRU B1100-6	MTF-539
B1103-1 THRU B1103-7	CONTRACT NO. GS-524-001 SHT. NO. A-1
B1105-1 THRU B1105-3	MTF-3975
B1110-1	MTF-5387

BENCHMARK LOCATION CHART

MONUMENT NUMBER	DESIGNATION	ELEV.	LOCATION COORDINATES NORTH	LOCATION COORDINATES EAST
97	–	–	255,012.93	256,752.03
100	–	–	255,081.33	254,050.83
101	–	–	255,259.60	254,038.68
102	–	–	255,248.54	253,407.25
DEAD END	–	–	255,821.405	252,541.581

LEGEND

- B1005-1 — BORING LOCATION (FUTURE)
- 28 — CONTOUR LINE (FUTURE)
- 512 — BENCHMARK LOCATION
- BENCHMARK LOCATION (REPORT 6323-01-001 "HIGH ACCURACY REFERENCE NETWORK")

GRAPHIC SCALE
200 100 0 200
SCALE: 1" = 200'

31	32	33	34	35	36
25	26	27	28	29	30
19	20	21	22	23	24
13	14	15	16	17	18
7	8	9	10	11	12
1	2	3	4	5	6

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

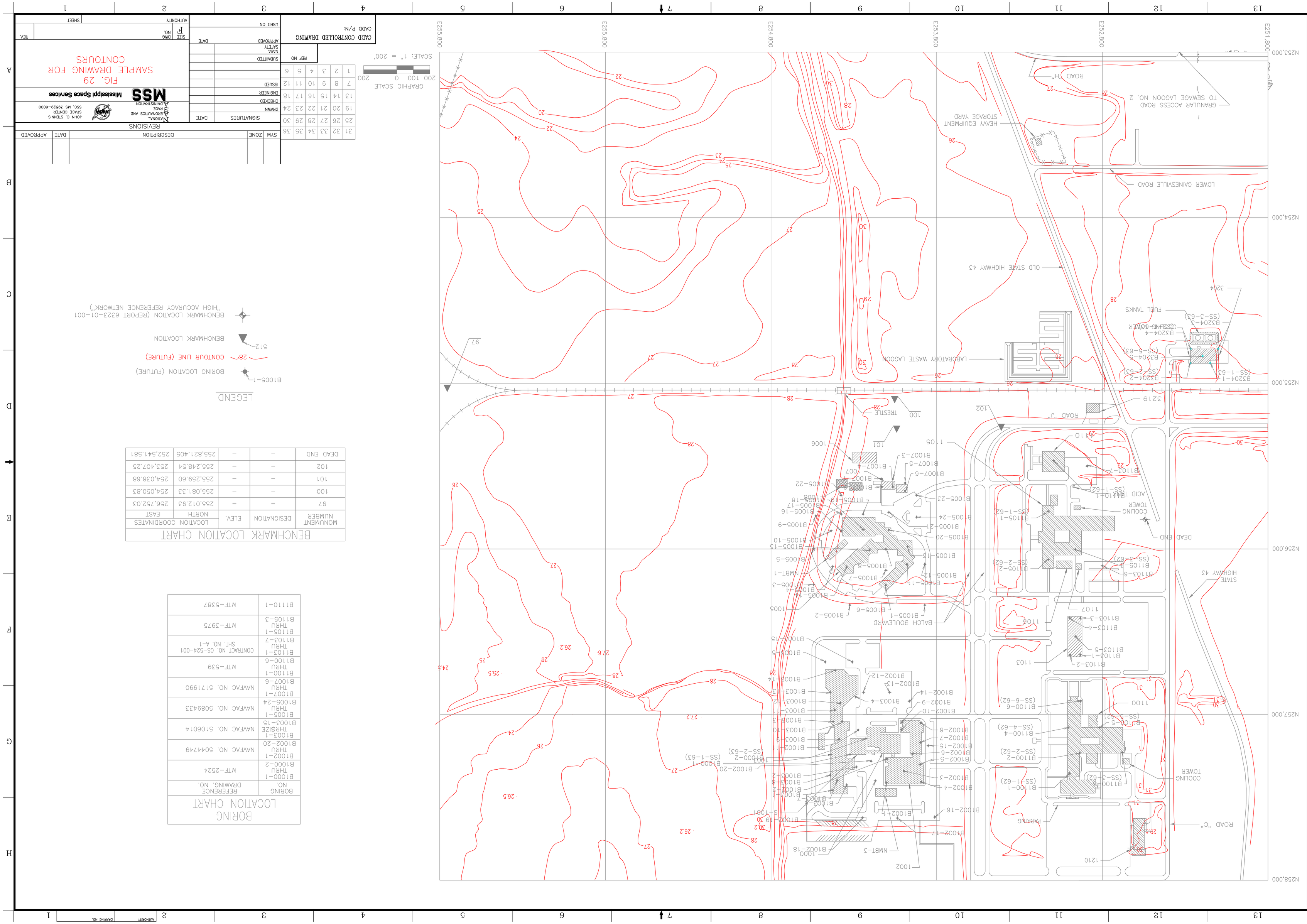
SIGNATURES	DATE
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ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
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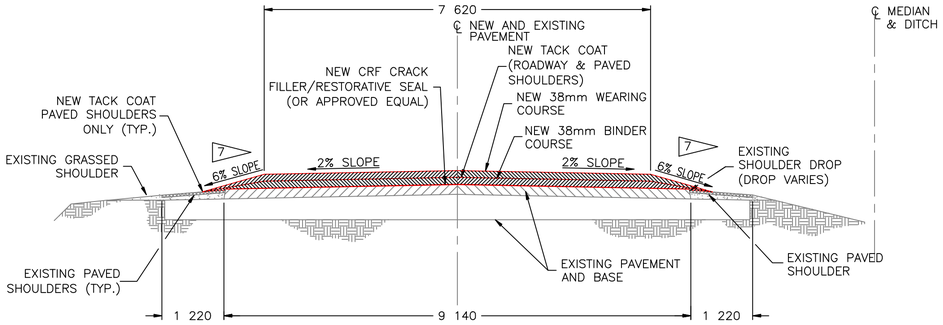
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SSC, MS 39529-6000

CONTRACTOR'S NAME

FIG. 28
SAMPLE DRAWING FOR SOIL BORING

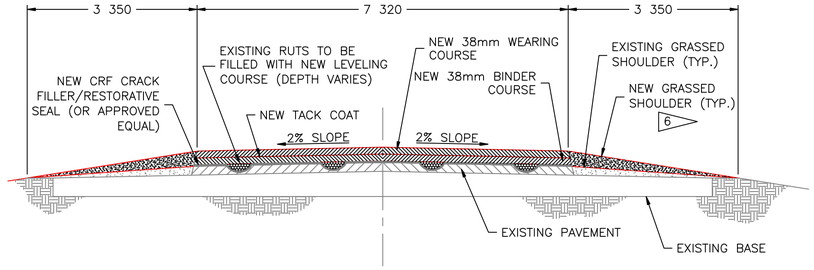
SIZE F | DWG NO. | REV.
AUTHORITY | SHEET


E255,800
E254,800
E253,800
E252,800
E251,800
N255,000
N254,000
N256,000
N257,000
N258,000
LOWER GAINESVILLE ROAD
OLD STATE HIGHWAY 43
LABORATORY WASTE LAGOON
GRANULAR ACCESS ROAD TO SEWAGE LAGOON NO. 2
HEAVY EQUIPMENT STORAGE YARD
ROAD "H"
ROAD "J"
ROAD "C"
FUEL TANKS
COOLING TOWER
ACID TANK
DEAD END
TRESTLE
PARKING
BATCH BOULEVARD
STATE HIGHWAY 43
3204
3219
1210
1100
1102
1103
1105
1107
1006
1005
1002
1000
101
100
97
B1005-1
B1005-2
B1005-3
B1005-4
B1005-5
B1005-6
B1005-7
B1005-8
B1005-9
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B1002-17
B1002-18
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B1002-20
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B1007-4
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B1103-2
B1103-3
B1103-4
B1103-5
B1103-6
B1103-7
B1100-1
B1100-2
B1100-3
B1100-4
B1100-5
B1100-6
B3204-1
B3204-2
B3204-3
B3204-4
B3204-5
B1110-1
NMBT-1
NMBT-2
NMBT-3
(SS-1-62)
(SS-2-62)
(SS-3-62)
(SS-4-62)
(SS-5-62)
(SS-6-62)
(SS-1-63)
(SS-2-63)
(SS-3-63)
(SS-5-63)
(SS-6-63)
(SS-7-63)
S-1001
S-1002
S-1003
S-1004
S-1005
S-1006
S-1007
S-1008
S-1009
S-1010
S-1011
S-1012
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S-1016
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S-1035
S-1036
S-1037
S-1038
S-1039
S-1040



SHUTTLE PARKWAY TYPICAL CROSS–SECTION

SCALE 1:50



SATURN DRIVE TYPICAL CROSS–SECTION

SCALE 1:50

NOTES:

1. CONTRACTOR SHALL RESTORE PAVEMENT MARKINGS, IN THE SAME LOCATION, ONLY AT AREAS COVERED BY OVERLAY, UNLESS OTHERWISE DIRECTED BY THE CONTRACTING OFFICER. MATCH EXISTING PATTERN IF PARTIALLY COVERED. IGNORE ANY PAVEMENT MARKING DETAILS WHICH DO NOT APPLY TO THIS PROJECT.
2. ALL PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES."

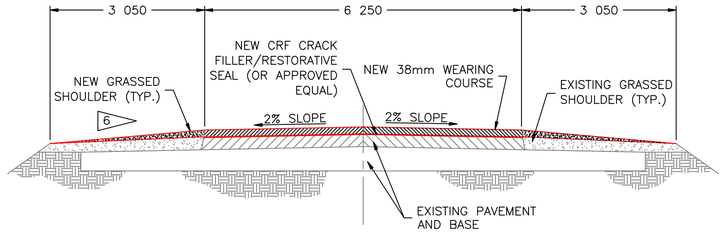
3 NO EDGE STRIPING IS REQUIRED FOR OPTION "B".

4 SEE DWG. C4 FOR TYPICAL TWO–WAY TRAFFIC PAVEMENT MARKING PLAN.

5 BINDER COURSE MAY NOT BE REQUIRED FOR ALL OPTIONS. SEE CROSS–SECTION FOR COURSE REQUIREMENTS.

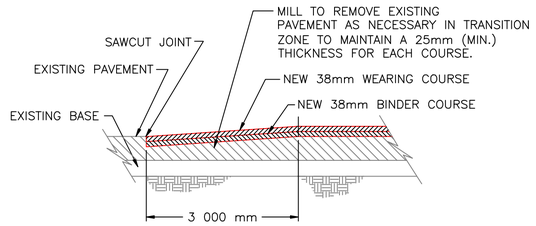
6 TOP SOIL SHALL BE PLACED IN THE TOP 75mm OF ALL AREAS TO BE GRASSED.

7 NEW PAVED SHOULDER SHALL NOT GO BEYOND EXISTING PAVED SHOULDER.



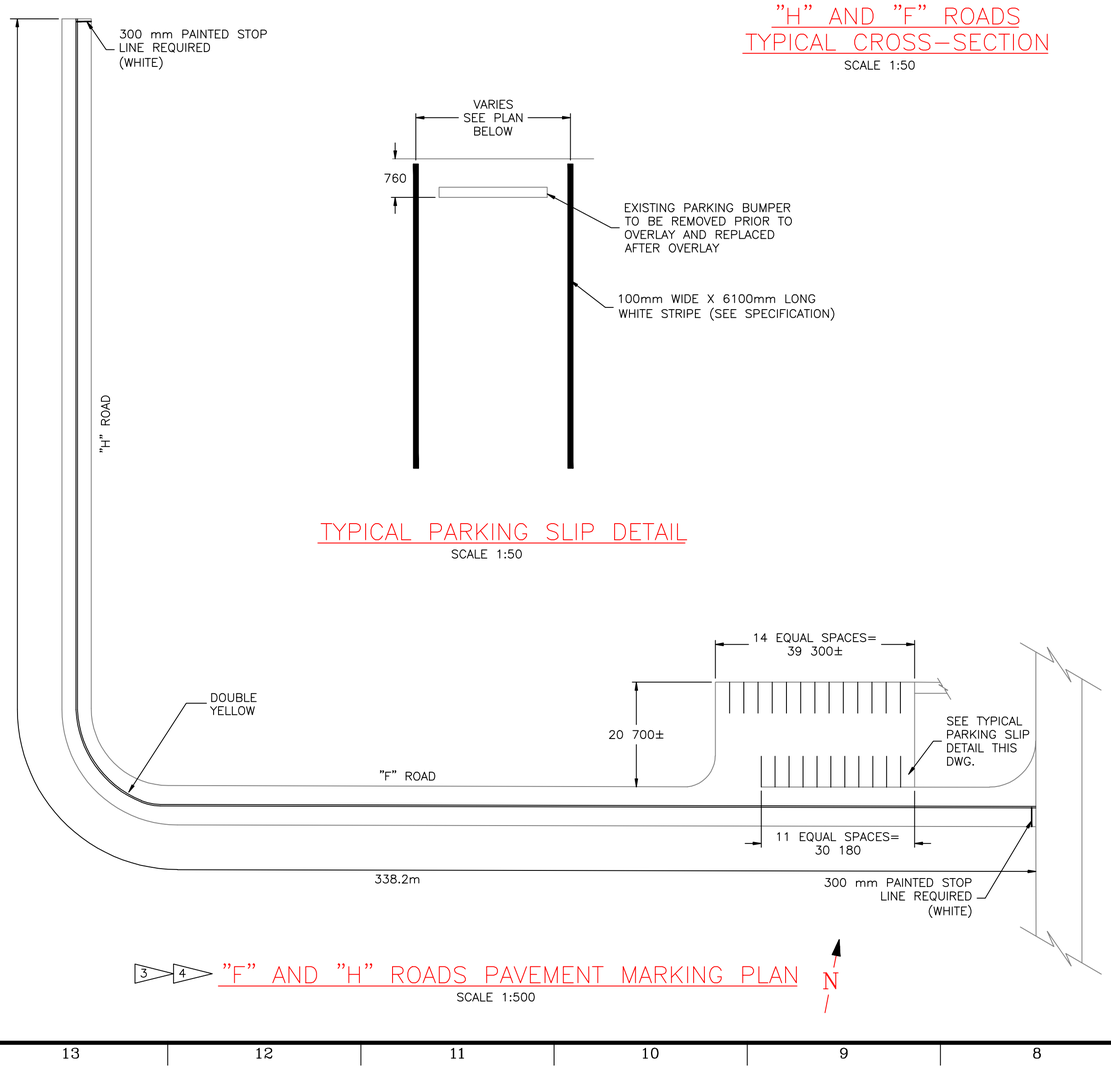
"H" AND "F" ROADS TYPICAL CROSS–SECTION

SCALE 1:50



5 TYPICAL TRANSITION JOINT DETAIL

SCALE 1:50



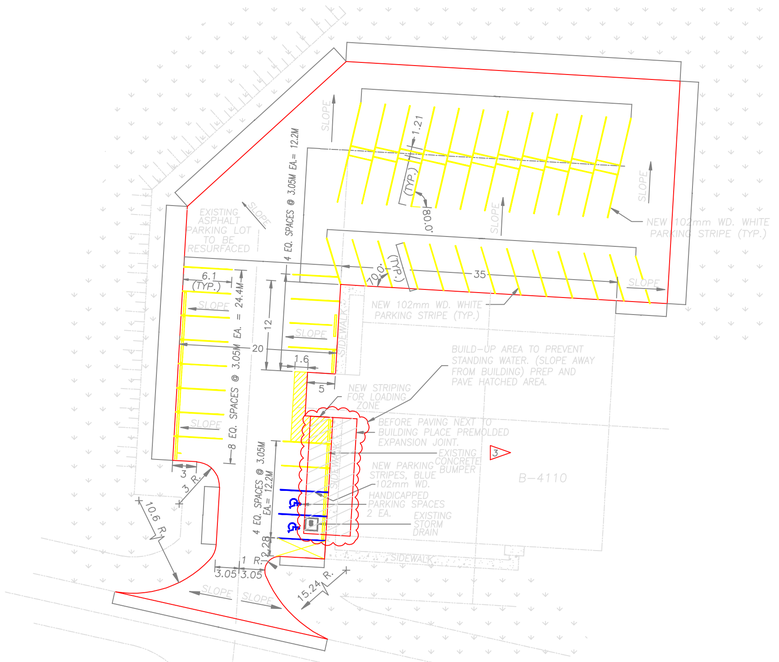
TYPICAL PARKING SLIP DETAIL

SCALE 1:50

3 4 "F" AND "H" ROADS PAVEMENT MARKING PLAN

SCALE 1:500

N



BUILDING 4110 PARKING LOT RESURFACING PLAN

SCAL: NTS

THIS IS A METRIC DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT AS NOTED.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

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CADD P/N:

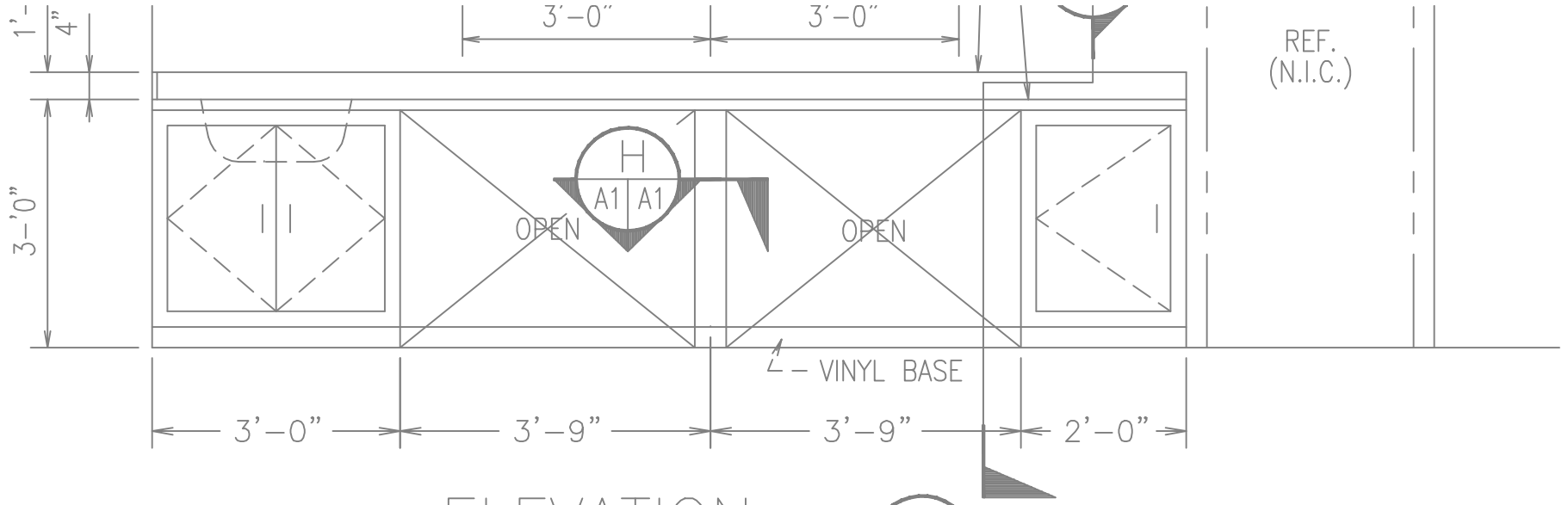
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN C. STENNIS SPACE CENTER
SSC, MS 39529–6000

CONTRACTOR'S NAME

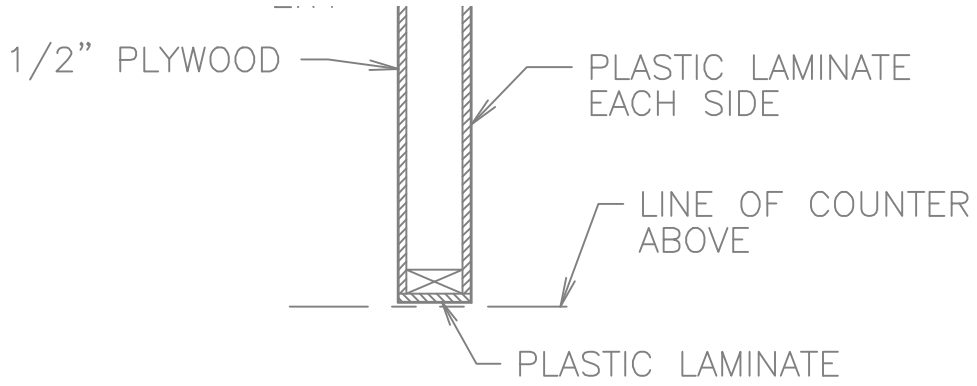
FIG. 30
SAMPLE DRAWING FOR ROAD AND PAVING

SIZE	DWG NO.	REV.
F		

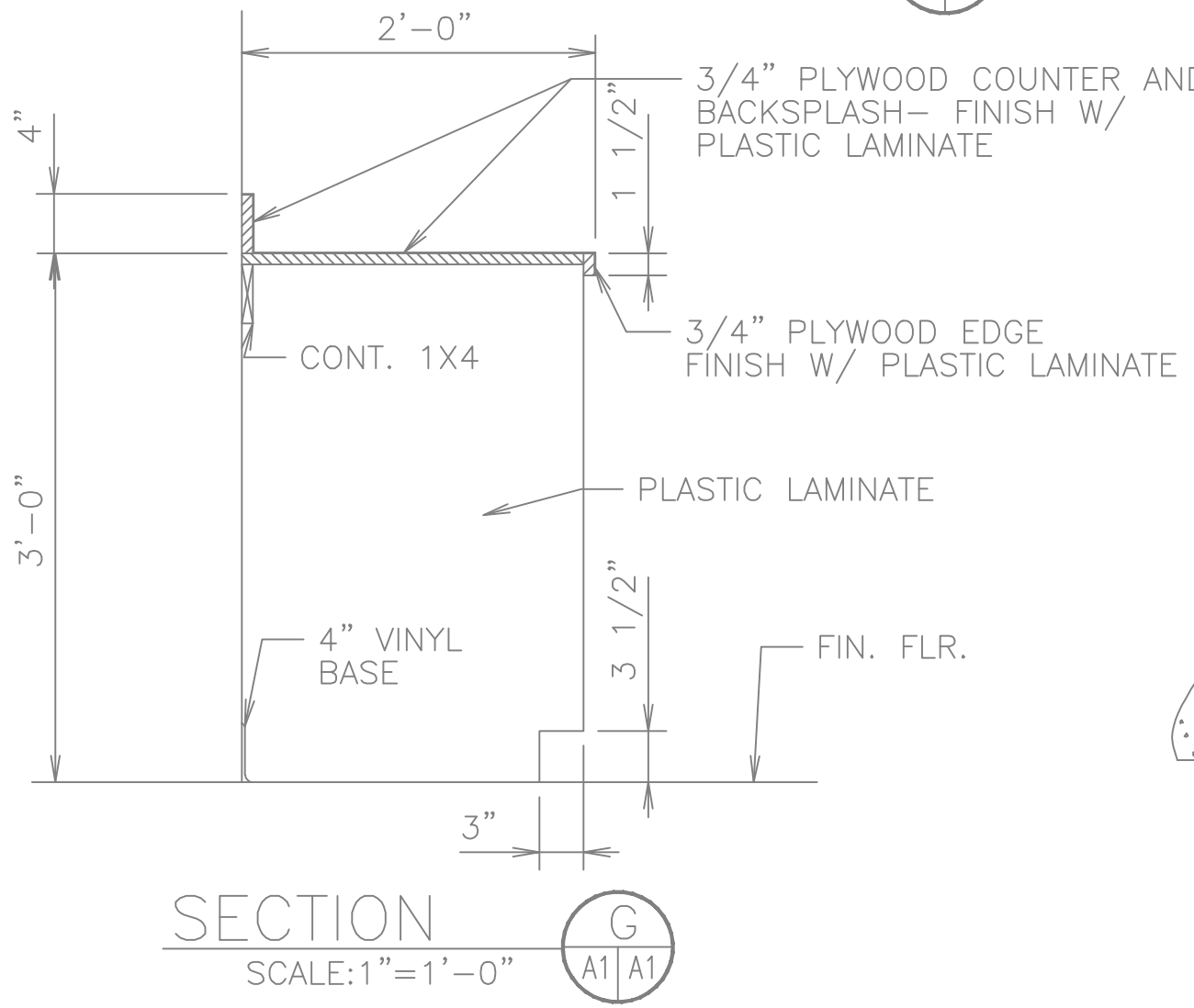
AUTHORITY | SHEET



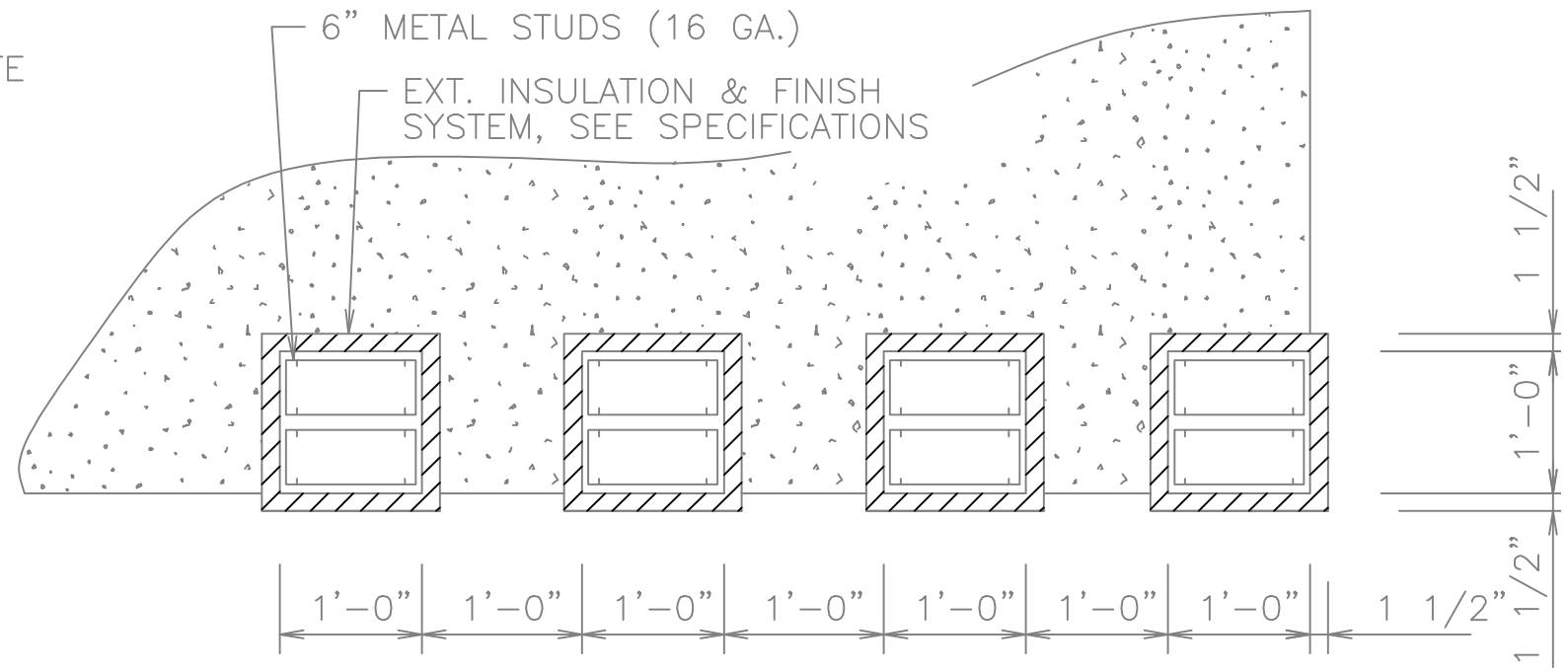
ELEVATION F
SCALE:1"=1'-0" A1 A1



SECTION H
SCALE:1"=1'-0" A1 A1



SECTION G
SCALE:1"=1'-0" A1 A1



DETAIL 2
SCALE: 3/4" = 1'-0" A1 A1
(TYP. EXTERIOR COLUMNS)

C
B
A
13
12
11
10
9

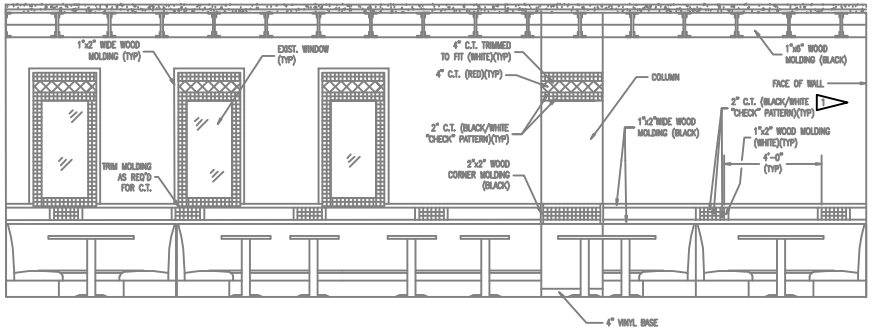
NOTES:

1. A 1"x6" (APPROX.) PIECE OF WOOD MOLDING SHALL BE INSTALLED CONTINUOUSLY AROUND THE PERIMETER OF THE SEATING AREA. THE BOTTOM OF THE MOLDING SHALL BE AT THE SAME ELEVATION AS THE BOTTOM OF THE JOISTS (10'-6" A.F.F.). THE MOLDING AND EVERYTHING ABOVE (INCLUDING JOISTS, BEAMS, METAL DECK, CONDUIT, WIRING, ETC.), EXCEPT DUCTWORK SHALL BE PAINTED RED.

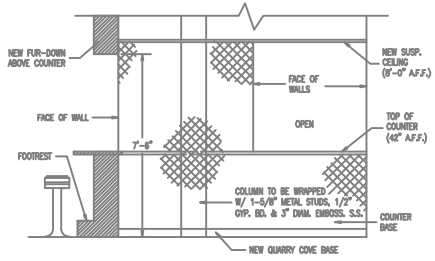
LEGEND:

———	EXISTING
———	NEW
C.T.	CERAMIC TILE
S.S.	STAINLESS STEEL
T.B.D.	TO BE DETERMINED
A.F.F.	ABOVE FINISH FLOOR

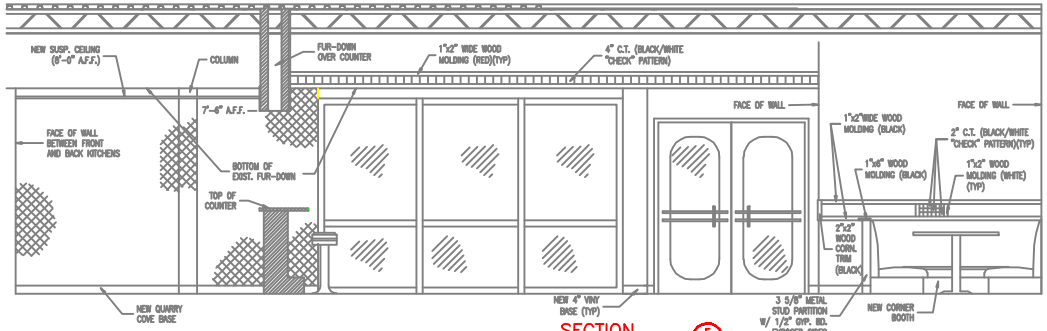
3" DIAMOND EMBOSSED STAINLESS STEEL PLATE



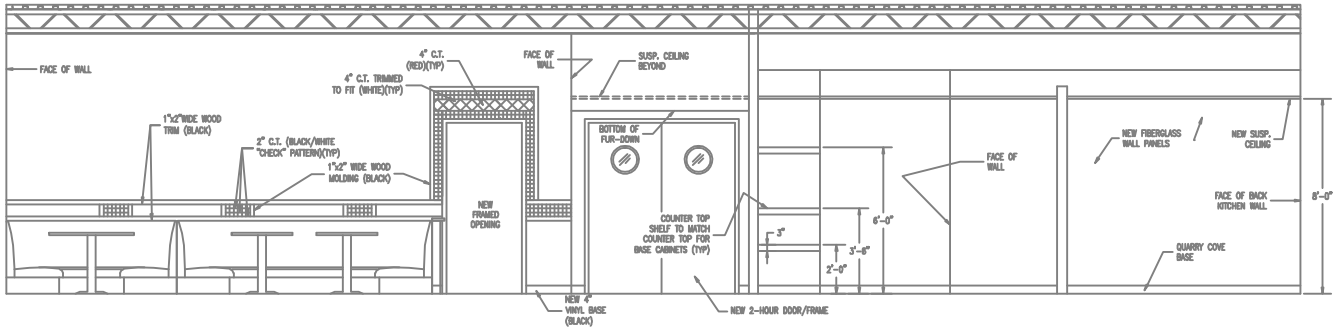
SECTION C
VIEW OF EAST WALL
SCALE: 1/4" = 1'-0"



SECTION D
VIEW OF EAST WALL
SCALE: 1/4" = 1'-0"



SECTION E
VIEW OF NORTH WALL
SCALE: 1/4" = 1'-0"



SECTION F
VIEW OF SOUTH WALL
SCALE: 1/4" = 1'-0"

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

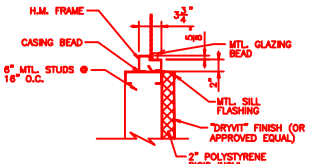
CADD CONTROLLED DRAWING
CADD P/N:

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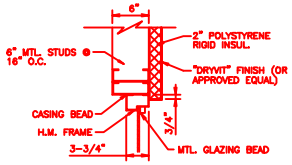
CONTRACTOR'S NAME

FIG. 32
SAMPLE DRAWING FOR INTERNAL SECTION

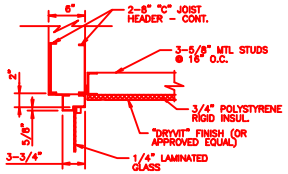
SIZE D | DWG NO. | REV
AUTHORITY | SHEET



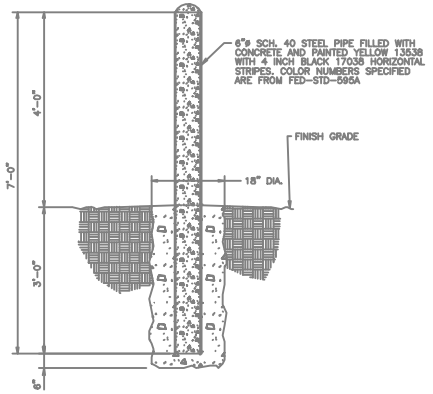
DETAIL – SILL
SCALE: 1 1/2" = 1'-0"
5 C5/C6



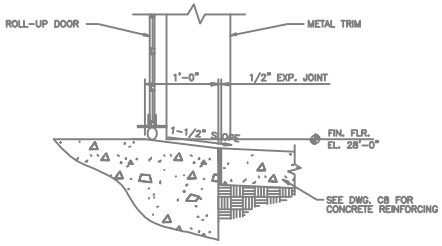
DETAIL – JAMB
SCALE: 1 1/2" = 1'-0"
7 C5/C6



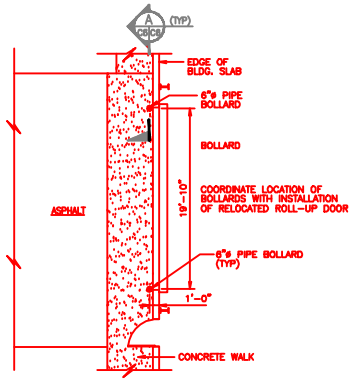
DETAIL – HEAD
SCALE: 1 1/2" = 1'-0"
9 C5/C6



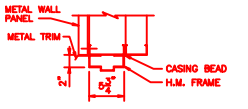
BOLLARD SECTION
SCALE: 1" = 1'-0"
A C5/C6



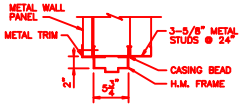
SECTION– ROLL-UP DOOR SILL
SCALE: 1 1/2" = 1'-0"
H C5/C6



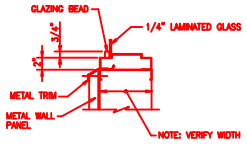
DETAIL – BOLLARD LOCATION PLAN
SCALE: 3/16" = 1'-0"
10 C5/C6



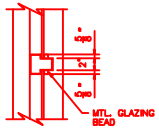
DETAIL – HEAD
SCALE: 1 1/2" = 1'-0"
13 C5/C6



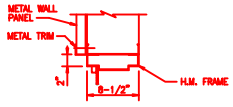
DETAIL – JAMB
SCALE: 1 1/2" = 1'-0"
14 C5/C6



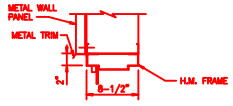
DETAIL – SILL
SCALE: 1 1/2" = 1'-0"
2 C5/C6



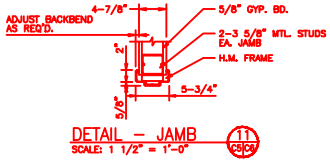
DETAIL – MULLION
SCALE: 1 1/2" = 1'-0"
12 C5/C6



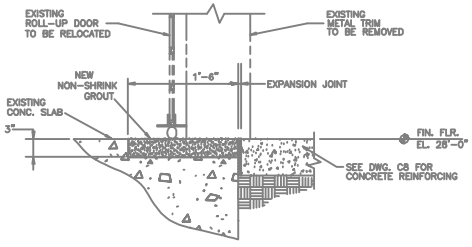
DETAIL – JAMB
SCALE: 1 1/2" = 1'-0"
6 C5/C6



DETAIL – HEAD
SCALE: 1 1/2" = 1'-0"
8 C5/C6



DETAIL – JAMB
SCALE: 1 1/2" = 1'-0"
11 C5/C6



SECTION– @ EXISTING ROLL-UP DOOR LOCATION SHOWING NEW SLAB TIE IN
SCALE: 1 1/2" = 1'-0"
AC C5/C6

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

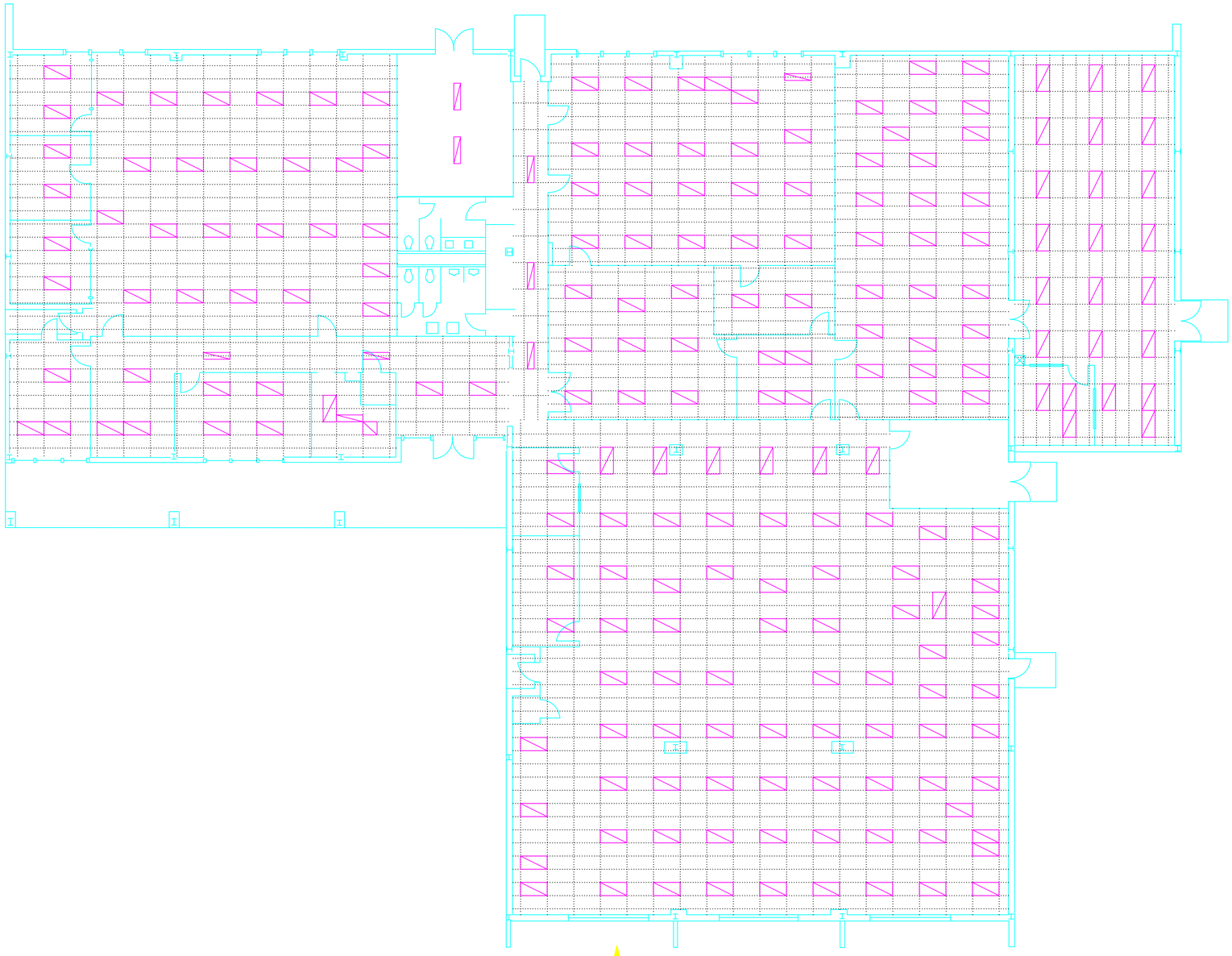
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CADD P/Nr

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CONTRACTOR'S NAME

FIG. 33
SAMPLE DRAWING FOR DETAILS

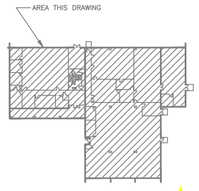
SIZE F | DWG NO. | REV
AUTHORITY | SHEET



N

REFLECTED CEILING PLAN

SCALE: 1/8"=1'-0"



KEY PLAN N

NTS

1

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

CADD CONTROLLED DRAWING

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CONTRACTOR'S NAME

FIG. 34
SAMPLE DRAWING FOR
REFLECTED CEILING PLAN

SIZE	DWG NO.	REV.
F		

AUTHORITY	SHEET

NOTES:

1. THE BASE CABINETS FOR THE WAITRESS STATION MAY BE CONSTRUCTED IN SEPARATE UNITS THAT FIT TOGETHER TO MAKE THE OVERALL REQUIRED LENGTH SHOWN ON THE FLOOR PLAN. NO DOORS ARE REQUIRED. ALL EXPOSED SURFACES OF THE BASE CABINET ARE TO BE LAMINATED (BLACK). COUNTER TOPS ARE 24"–36" WIDE DEPENDING ON THE LOCATION. SEE THE FLOOR PLAN FOR DIMENSIONS. ALL COUNTER TOPS SHALL BE LAMINATED WITH FORMICA "MOUSE BUST" MATTE FINISH. THE COUNTER TOPS FOR THE BASE CABINETS (MENTIONED ABOVE) SHALL HAVE A BACK SPLASH. THE COUNTER TOP FOR THE "COUNTER" SHALL BE 24" WIDE AND HAVE SQUARED EDGES (NO BACK SPLASH). ONE EDGE SHOULD BE LAMINATED WHILE THE OTHER DOES NOT REQUIRE LAMINATING. ALUMINUM FLUTED MOLDING (1–1/4") SHALL BE INSTALLED ON THE NON-LAMINATED EDGE. THE ALUMINUM FLUTED MOLDING SHALL BE ORDERED WITH THE DINING TABLES SO THE MOLDING WILL MATCH.
2. DOOR TYPE 2 TO BE LAMINATED (BOTH SIDES) WITH 24 GAUGE 3" DIAMOND EMBOSSED STAINLESS STEEL TO MATCH FRONT KITCHEN WALLS.
3. SEE DWG. A3 FOR ADDITIONAL COUNTER TOP (SHELVES FOR WAITRESS STATION #1).

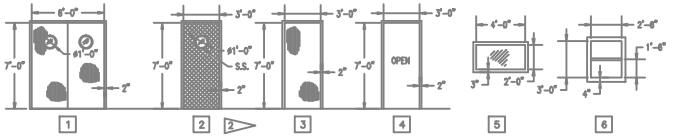
FINISH SCHEDULE

ROOM	FLOOR: CERAMIC TILE	FLOOR: VINYL COMPOSITION TILE	FLOOR: EXPOSED CONCRETE	BASE: VINYL COVE	BASE: CERAMIC COVE	BASE: WOOD	WALLS: PAINT GYP. BD.	WALLS: CERAMIC TILE WAINSCOT	WALLS: DECORATIVE CERAMIC WALL TILE	WALLS: WOOD TRIM	WALLS: EXISTING TO REMAIN UNPAINTED	CEILING: ACOUSTICAL CEILING TILE	CEILING: GYPS. BOARD — PAINT TO MATCH EXISTING
BACK KITCHEN	●				●			●				●	
FRONT KITCHEN	●				●			●				●	
SEATING AREA		●		●			●		●	●			●
WAITRESS STATION #1		●		●			●					●	
WAITRESS STATION #2		●		●			●					●	
CORRIDOR ROOM	●				●		●						●
MECH./ELEC. ROOM			●			●	●						●
VESTIBULE		●		●			●						●

NOTE: CORRIDOR ROOM NOT SHOWN ON FLOOR PLAN. SEE ATTACHED MATERIAL REQUEST FOR LOCATION OF CORRIDOR ROOM.

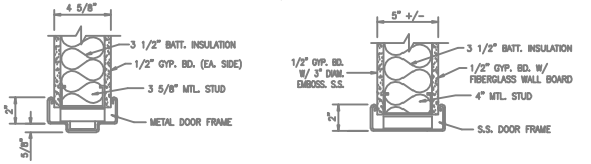
OPENING SCHEDULE

MARK	OPENING SIZE	TYPE	MAT'L	HDWR SET	FRAME MAT'L	FRAME DETAIL HEAD	FRAME DETAIL JAMB	REMARKS	COLOR
1	(2) 3'–0" x 7'–0"	1	H.M. W/ 1/4" LAMINATED SAFETY GLASS	1	H.M.	–	–	2–HR RATED DOOR AND FRAME (REPLACE EXISTING)	DOOR/FRAME – BLACK LIGHT FRAME – RED
2	3'–0" x 7'–0"	2	H.M. W/ 1/4" LAMINATED SAFETY GLASS	2	S.S.	2	2	DOOR TO BE LAMINATED W/ 3" DIAM. EMBOSS. S.S. SHEET	–
3	3'–0" x 7'–0"	2	H.M. W/ 1/4" LAMINATED SAFETY GLASS	2	S.S.	2	2	DOOR TO BE LAMINATED W/ 3" DIAM. EMBOSS. S.S. SHEET	–
4	3'–0"x7'–0"	3	H.M.	3	H.M.	1	1		DOOR/FRAME – BLACK
5	3'–0"x7'–0"	4	FRAMED OPENING	–	H.M.	1	1		FRAME – BLACK
6	3'–0"x7'–0"	4	FRAMED OPENING	–	H.M.	1	1		FRAME – BLACK
A	11'–0"x8'–0"	5	1/4" LAMINATED SAFETY GLASS	–	H.M.	–	–		FRAME – BLACK
B	2'–6" x 3'–0"	6	PASS THROUGH SERVICE WINDOW	–	S.S.	–	–		–



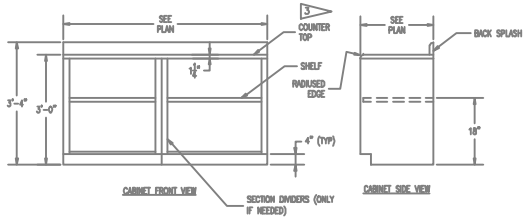
OPENING TYPES

SCALE: 1/4" = 1'–0"



DOOR JAMB & HEAD–DETAIL (3) SCALE: 3" = 1'–0"

DOOR JAMB & HEAD–DETAIL (4) SCALE: 3" = 1'–0"



TYPICAL BASE CABINET DETAILS (1) SCALE: 3/4" = 1'–0"

HARDWARE SCHEDULE (OR APPROVED EQUAL)

(1) SEATING AREA EXIT DOORS (TO VESTIBULE)(METAL)

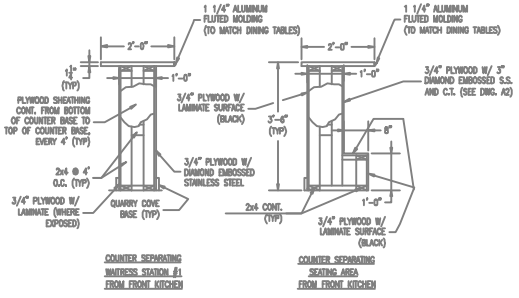
- 3 – PAIR HINGES "HAGER" BB–1168
- 2 – CLOSER "LCN" SMOOTHIE 4130
- 2 – EXIT DEVICE "MONARCH" F–18–V, CONTROL TRIM L–CONTROL DANE TRIM
- 1 – THRESHOLD "HAGER" 520S

(2) KITCHEN 2–WAY SWING DOORS (METAL)

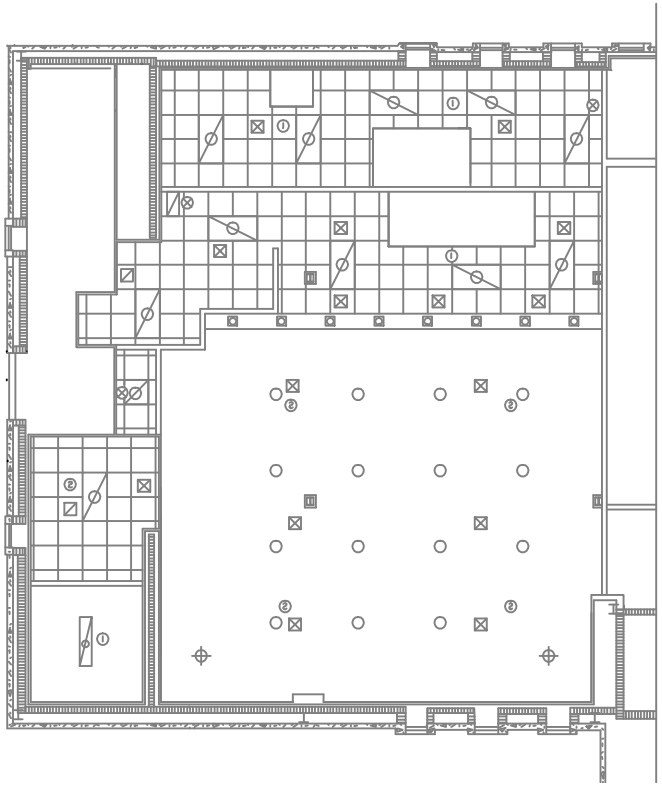
- 1 1/2 – PAIR HINGES "BOMMER" 3029–8x4.5 STAINLESS STEEL
- 2 – PUSHPLATES 4"x16" "IVES" 8200, STAINLESS STEEL
- 2 – KICKPLATES 6"x26" "IVES" 8400, STAINLESS STEEL

(3) MECH./ELEC. ROOM DOOR (METAL)

- 1 1/2 – PAIR HINGES "HAGER" BB–1168
- 1 – LOCKSET "ARROW" H–12
- 3 – SILENCERS "TRIMCO" 1229A



TYPICAL COUNTER DETAILS SCALE: 3/4" = 1'–0"



NEW RESTAURANT REFLECTED CEILING PLAN SCALE: 1/4" = 1'–0"

N

LEGEND:

- EXISTING
- NEW
- 2'x4' LAY IN FIXTURE
- 2'x4' LAY IN FIXTURE
- 2'x2' RECESSED FLUORESCENT FIXTURE
- RECESSED FIXTURES OVER COUNTER
- RETURN REGISTER
- SUPPLY REGISTER
- PENDENT FIXTURE DIMING AREA (GENERAL)
- PENDENT FIXTURE DIMING AREA (OVER CORNER BOOTHS)
- (1) HEAT DETECTOR
- EXIT SIGN
- (S) SMOKE DETECTOR
- C.T. CERAMIC TILE
- S.S. STAINLESS STEEL
- 3" DIAMOND EMBOSSED STAINLESS STEEL PLATE

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

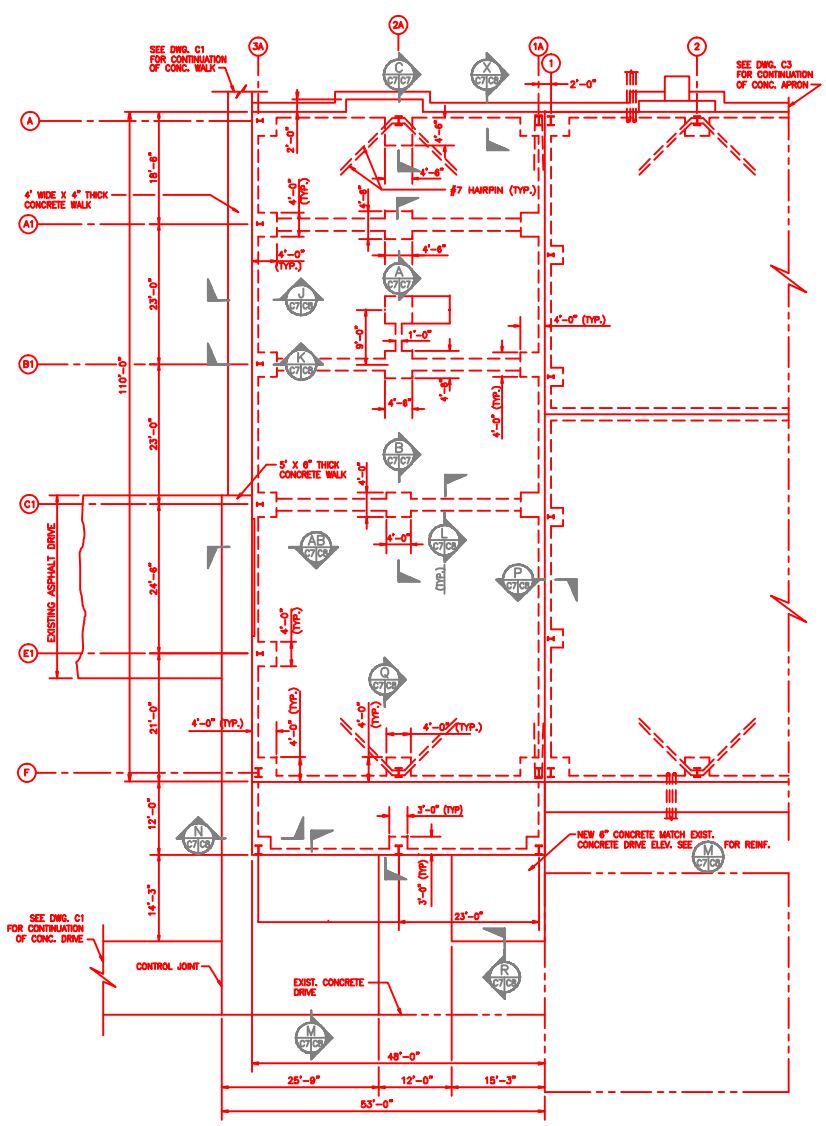
CADD CONTROLLED DRAWING
CADD P/N:

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CONTRACTOR'S NAME

FIG. 35
SAMPLE DRAWING FOR ROOM FINISH SCHEDULE

SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



FOUNDATION PLAN —N→
SCALE: 1/8" = 1'-0"

NOTES:

1. FOUNDATIONS SHOWN ARE BASED ON PRELIMINARY DESIGN LOADS FOR TYPICAL METAL BUILDING. CONTRACTOR SHALL SUBMIT REVISED FINAL DESIGN FOR FOUNDATIONS, STAMPED BY A PROFESSIONAL ENGINEER, BASED ON FINAL REACTIONS SUPPLIED BY METAL BUILDING MANUFACTURER. ENGINEERING SERVICES AND ADDITIONAL FOUNDATION COSTS SHALL BE AT NO ADDITIONAL COST TO THE GOVERNMENT.
2. FOUNDATION DESIGN SOIL PRESSURE SHALL BE 2500 PSF.
3. BUILDING LOADS SHALL BE AS FOLLOWS:

   LIVE LOAD (ROOF) – IN ACCORDANCE WITH ASCE 7-95 (MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES)

   WIND LOAD – PER ASCE 7-95 (DESIGN WIND SPEED – 125 MPH, EXPOSURE "C")

   UNIFORM COLLATERAL LOAD – 5 psf

   NEW MOMENT FRAME AT COLUMN LINE 1A SHALL BE DESIGNED TO SUPPORT ALL LIVE, DEAD AND WIND LOADS APPLIED TO TRIBUTARY AREA BETWEEN COLUMN LINES 2 AND 2A, IN ADDITION, ROOF BEAMS AT COLUMN LINE 1 SHALL BE SUPPORTED BY NEW MOMENT FRAME AT COLUMN LINE 1A.
4. CONTRACTOR WILL HAVE THE OPTION OF INSTALLING ADDITIONAL CONSTRUCTION JOINTS IN SLAB. JOINT LOCATIONS AND CONSTRUCTION DETAILS MUST BE APPROVED BY THE CONTRACTING OFFICER.
5. REFER TO DWGS. M1 AND E1 FOR ADDITIONAL ITEMS TO BE EMBEDDED IN, BELOW OR THRU CONCRETE NOT SHOWN ON THIS DWG.

CONT. NOTES:

6. CONTROL JOINTS SHALL BE 1/8" X 1", FILLED WITH JOINT FILLER MAX. SPACING OF CONTROL JOINTS SHALL BE AS FOLLOWS:

   – 4FT. CONCRETE WALK – 4FT.

   – 5FT. CONCRETE WALK – 5FT.

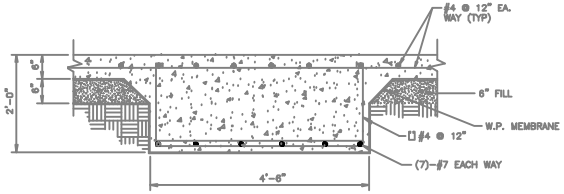
   – 12FT. CONCRETE DRIVE – 12FT. X 12FT.

   – SLAB – 25FT. X 25FT.

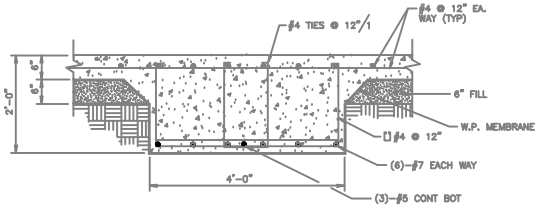
   THERE SHALL BE A CONTROL JOINT AT EVERY RE-ENTRANT CORNER.
7. COLUMN FOOTINGS ARE DESIGNED BASED ON THE FOLLOWING COLUMN REACTIONS (K = KIPS) (– = TENSION ON FOOTING, + = COMPRESSION ON FOOTING.)

FOOTING SIZE	VERTICAL LOAD
5' X 5' X 2'	-28.3 K (+63.6 K W/O WIND)
4' X 4' X 2'	-28.3 K (+37.3 K W/O WIND)
3' X 3' X 2'	-2.5 K (+3.3 K W/O WIND)

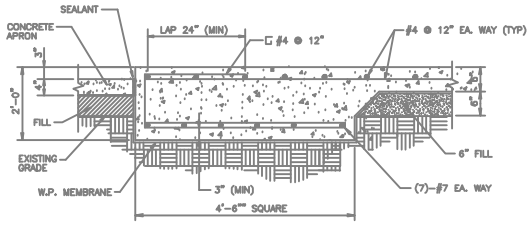
HORIZONTAL FORCES WERE NOT CONSIDERED IN THE DESIGN OF THE CONCRETE FOOTINGS DUE TO THE DIFFERENCES BETWEEN MANUFACTURER'S HORIZONTAL BRACING LOCATIONS. FOOTINGS SHALL BE CHECKED FOR ADEQUACY BY A REGISTERED PROFESSIONAL ENGINEER USING HORIZONTAL COLUMN REACTIONS SUPPLIED BY THE METAL BUILDINGS MANUFACTURER.



SECTION A C7/C7
SCALE: 1" = 1'-0"



SECTION B C7/C7
SCALE: 1" = 1'-0"



SECTION C C7/C7
SCALE: 1" = 1'-0"

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

CONTRACTOR'S NAME

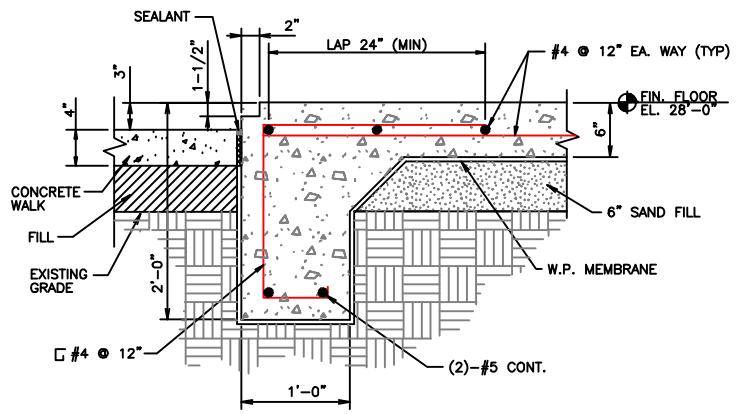
FIG. 36
SAMPLE DRAWING FOR FOUNDATION PLAN

CADD CONTROLLED DRAWING
CADD P/Nr

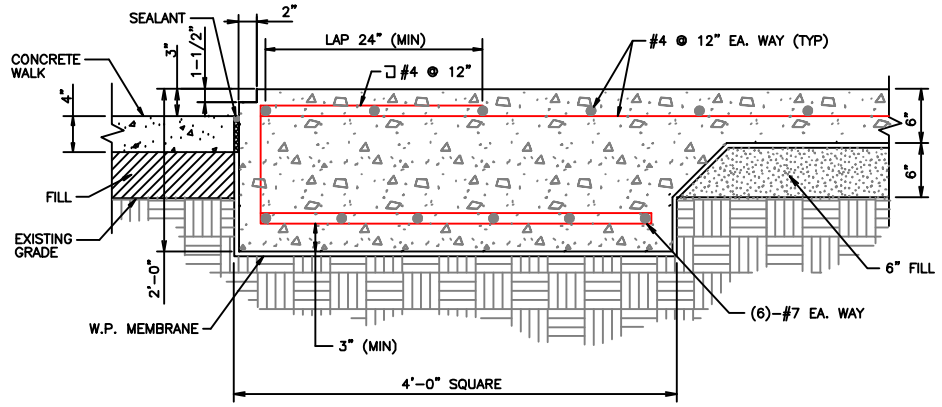
REF NO

SIZE F | DWG NO. | REV

AUTHORITY | SHEET



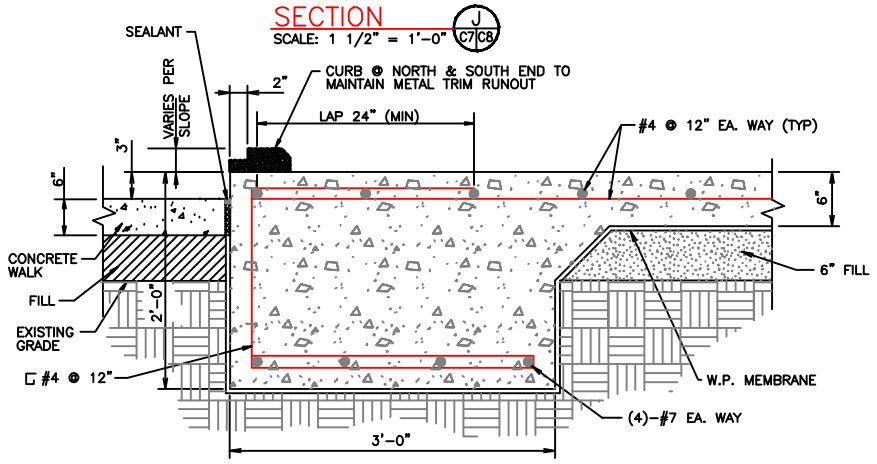
SECTION J C7/C8
SCALE: 1 1/2" = 1'-0"



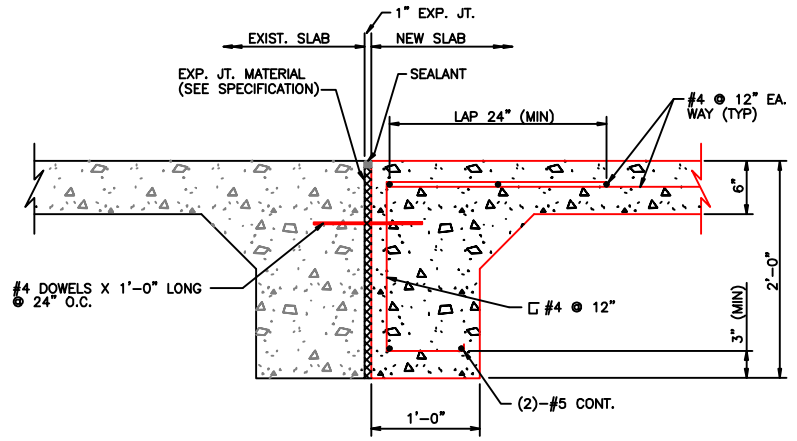
SECTION K C7/C8
SCALE: 1 1/2" = 1'-0"

NOTES:

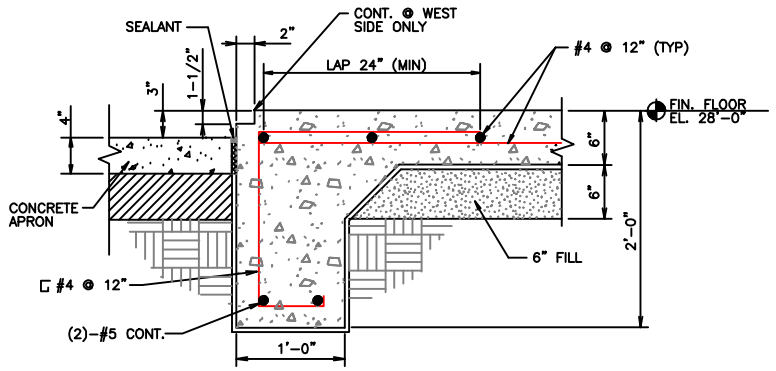
1. SEE SPECIFICATION FOR CONCRETE AND REBAR STRENGTH.
2. EXPANSION JOINTS SHALL BE 1" NON-EXTRUDING FILLER, IN ACCORDANCE WITH ASTM D994-94. SEE DWG. C7 FOR SPACING.
3. CONTROL JOINTS SHALL BE 1/8" X 1 1/8" PRE-FORMED PLASTIC OR HARDBOARD STRIP. SEE DWG. C7 FOR SPACING.
4. ALL CONCRETE SHALL BE REINFORCED WITH SYNTHETIC FIBERS, SEE SPECIFICATION.



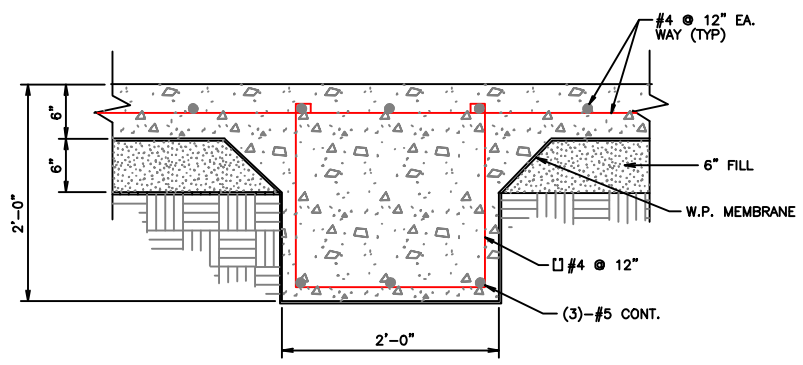
SECTION N C7/C8
SCALE: 1 1/2" = 1'-0"



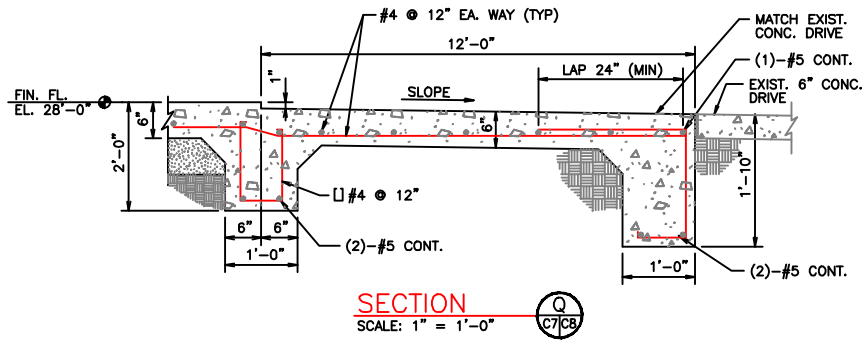
SECTION P C7/C8
SCALE: 1 1/2" = 1'-0"



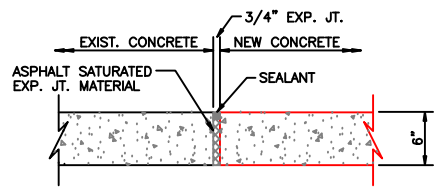
SECTION X C7/C8
SCALE: 1 1/2" = 1'-0"



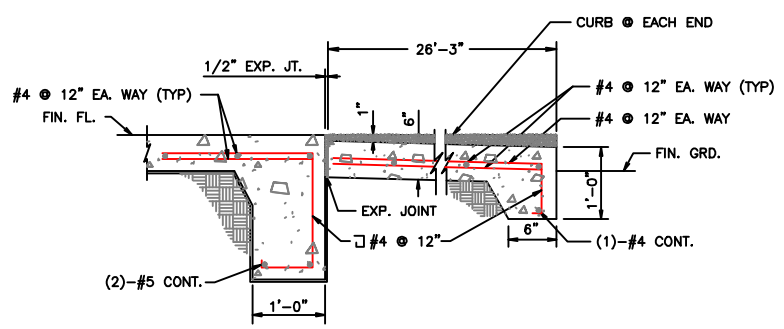
SECTION L C7/C8
SCALE: 1 1/2" = 1'-0"



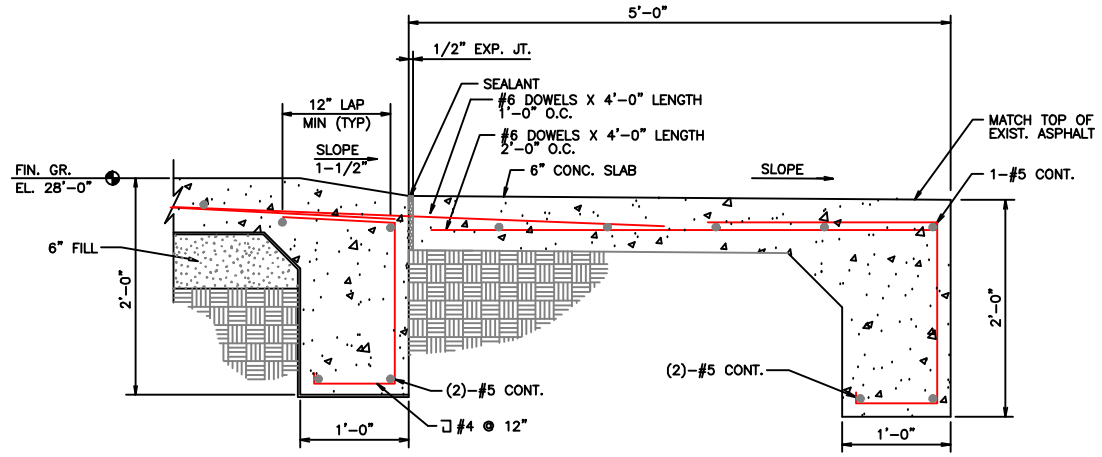
SECTION Q C7/C8
SCALE: 1" = 1'-0"



SECTION R C7/C8
SCALE: 1 1/2" = 1'-0"



SECTION M C7/C8
SCALE: 1" = 1'-0"



SECTION AB C7/C8
SCALE: 1 1/2" = 1'-0"

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

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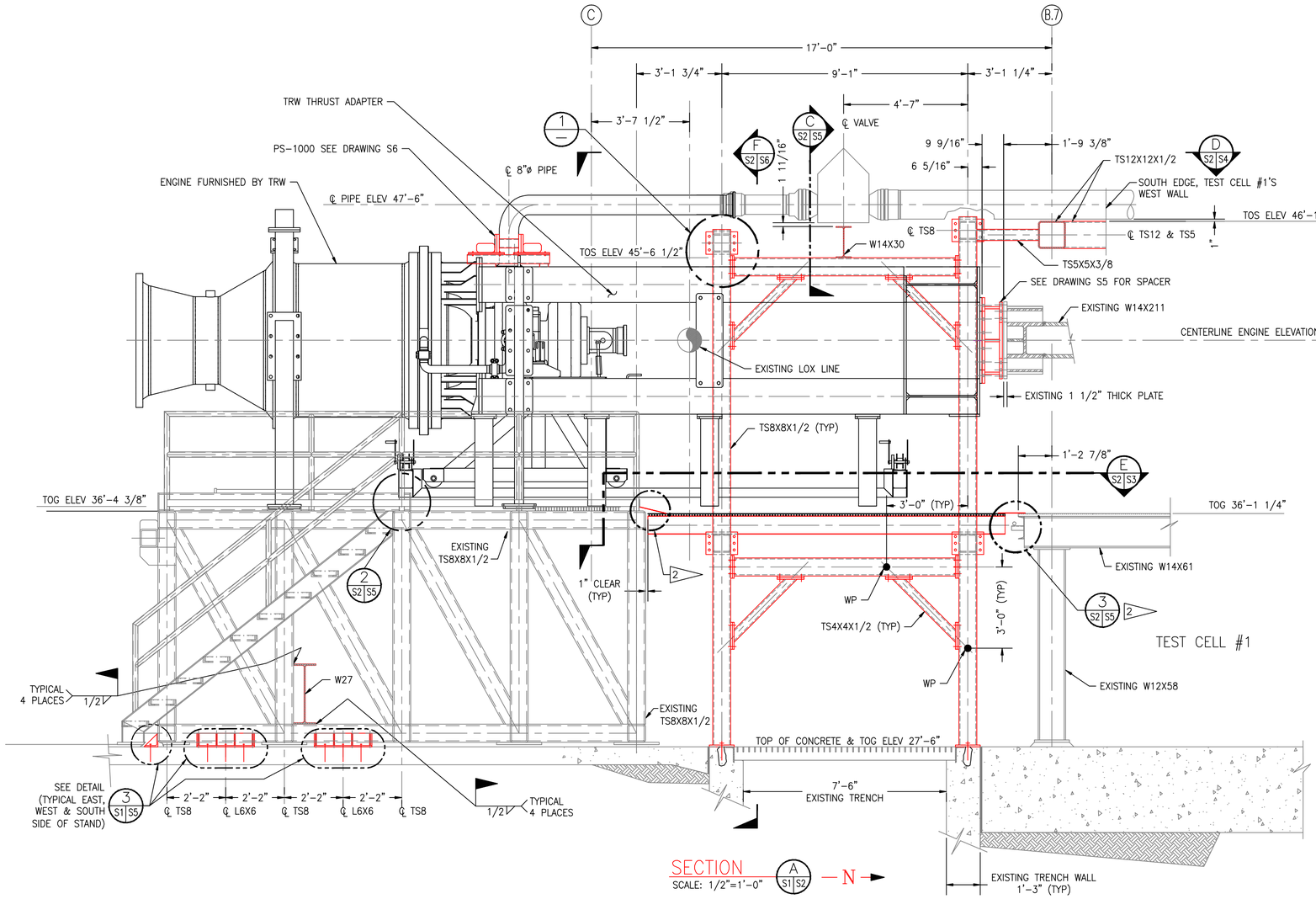
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CADD P/N:

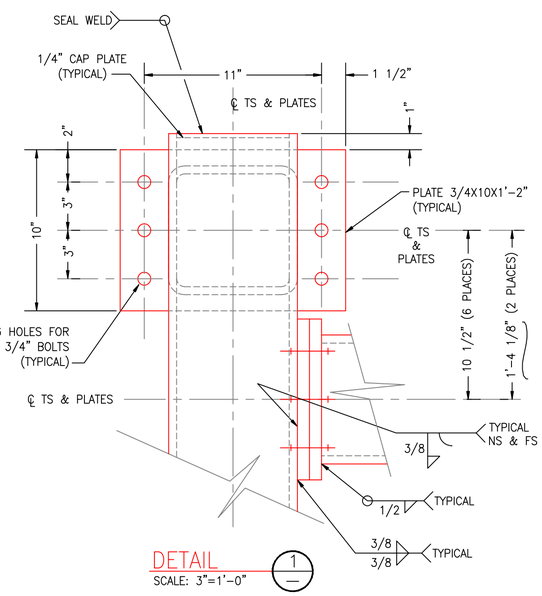
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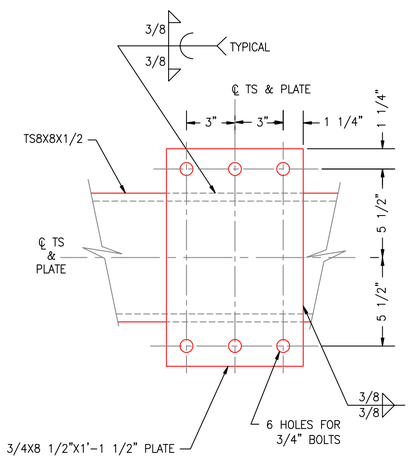
CONTRACTOR'S NAME

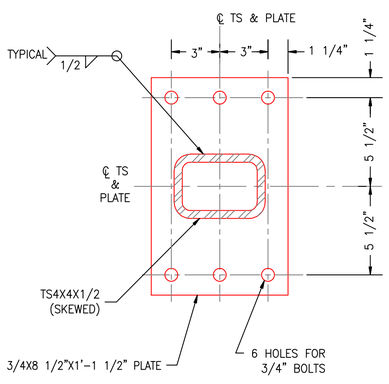
FIG. 37
SAMPLE DRAWING FOR FOUNDATION SECTIONS

SIZE F | DWG NO. | REV.
AUTHORITY | SHEET





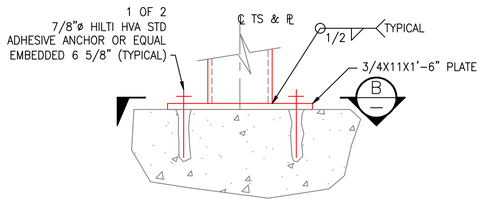


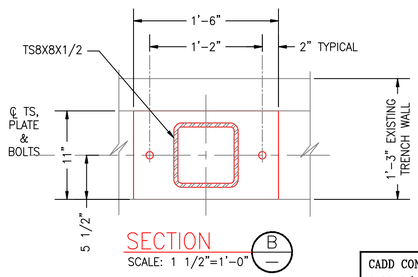


TYPICAL BRACE PLATE CONNECTION TO TS8X8X1/2

TYPICAL BRACE PLATE CONNECTION TO TS4X4X1/2

TYPICAL BRACE CONNECTION
SCALE: 3"=1'-0"





NOTES:

1. TRW COMMODITY WEIGHTS:
   TCA(INJ/IGN/CHAMB) – 30,000 LBS
   THRUST STAND AND INJ CART – 35,500 LBS
2. 1/4"X12" CONTINUOUS GALVANIZED CARBON STEEL CHECKERED PLATE FILLET WELDED TO GRATING ON ONE SIDE. SEE DETAIL 3 S2 S5 (SIMILAR 2 PLACES).

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
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CONTRACTOR'S NAME

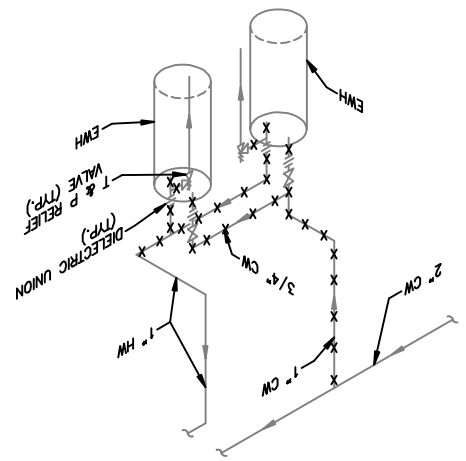
FIG. 38
SAMPLE DRAWING FOR FRAMING

SIZE	DWG NO.	REV.
F		

AUTHORITY | SHEET

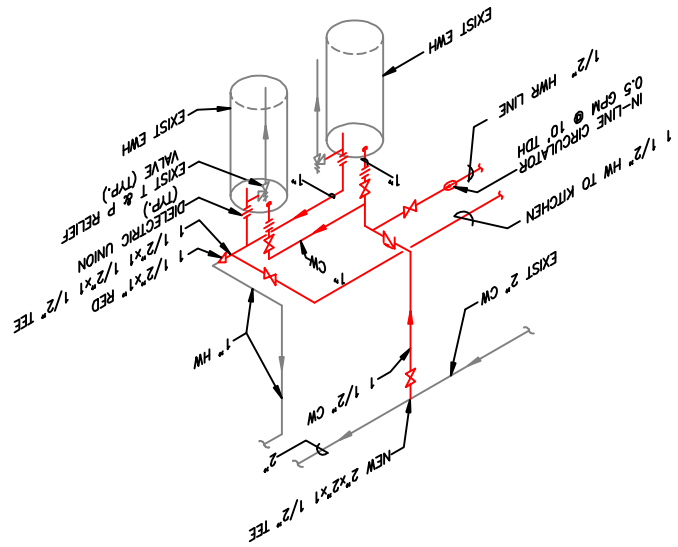
EXIST. ISO EWH PIPING

N.T.S.



ISO EWH PIPING

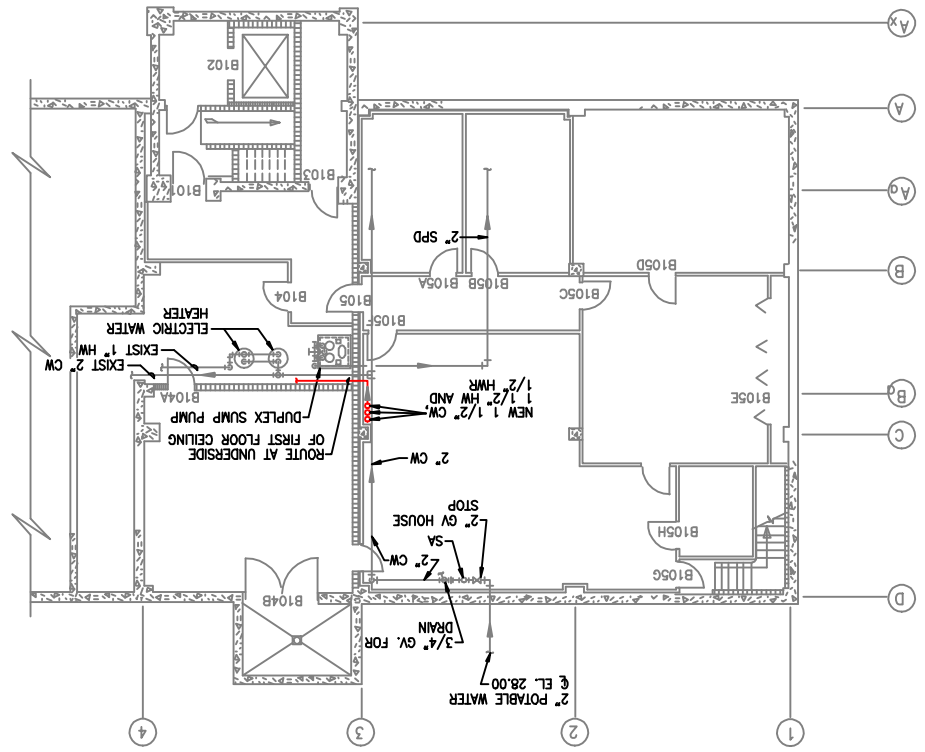
N.T.S.



MECHANICAL BASEMENT PLAN

SCALE: 1/8" = 1'-0"

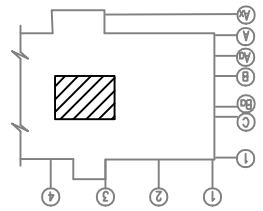
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KEY PLAN–BASEMENT BLDG. 1200

N.T.S.

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USED ON

CADD CONTROLLED DRAWING

CADD P/N:

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	

CONTRACTOR'S NAME

FIG. 39
SAMPLE DRAWING FOR PIPING

SIZE	DWG NO.	REV.
FI		

SHEET

AUTHORITY

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

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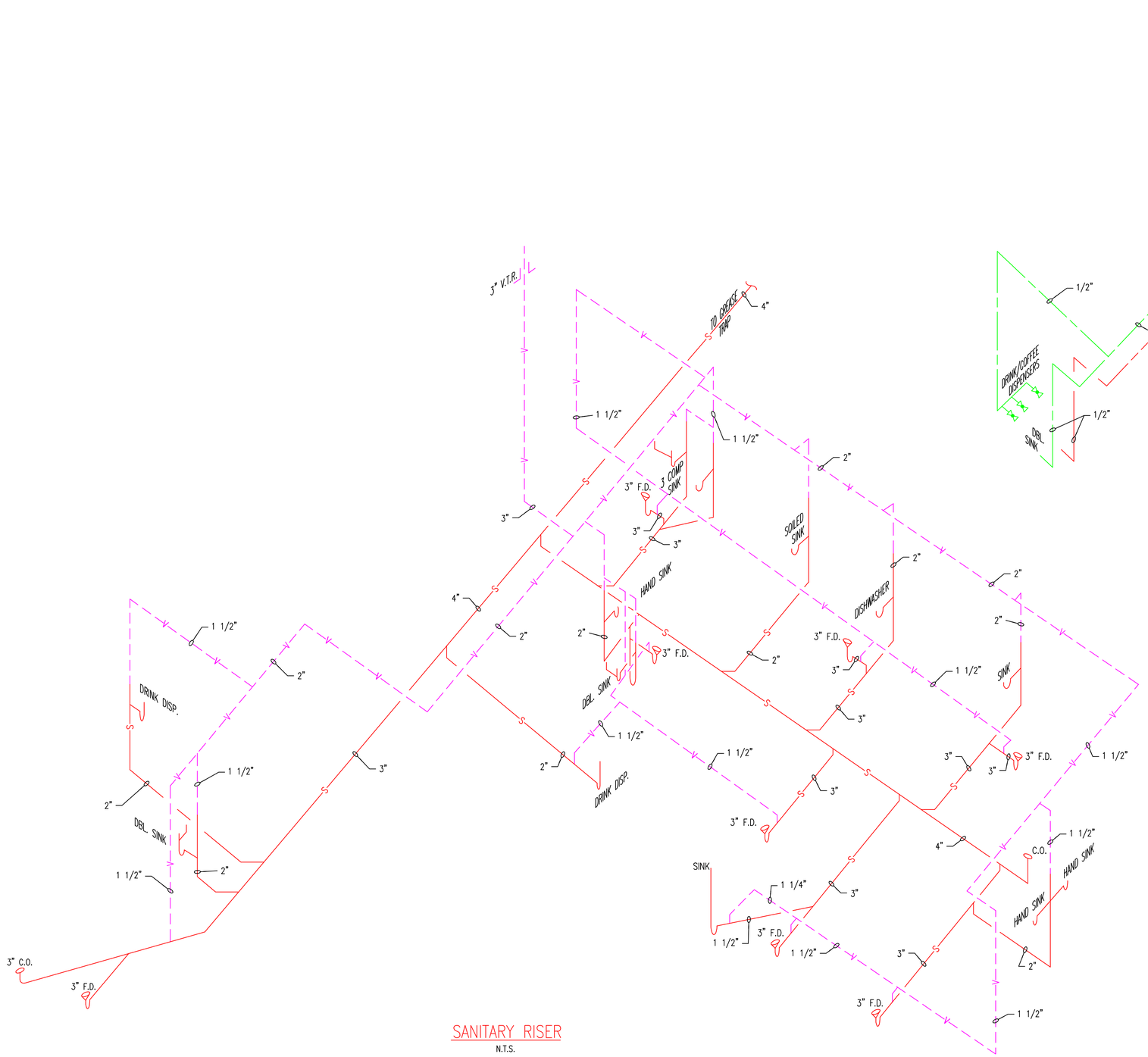
LEGEND:

SEE DWG. M1 FOR LEGEND.

AUTHORITY | DRAWING NO.

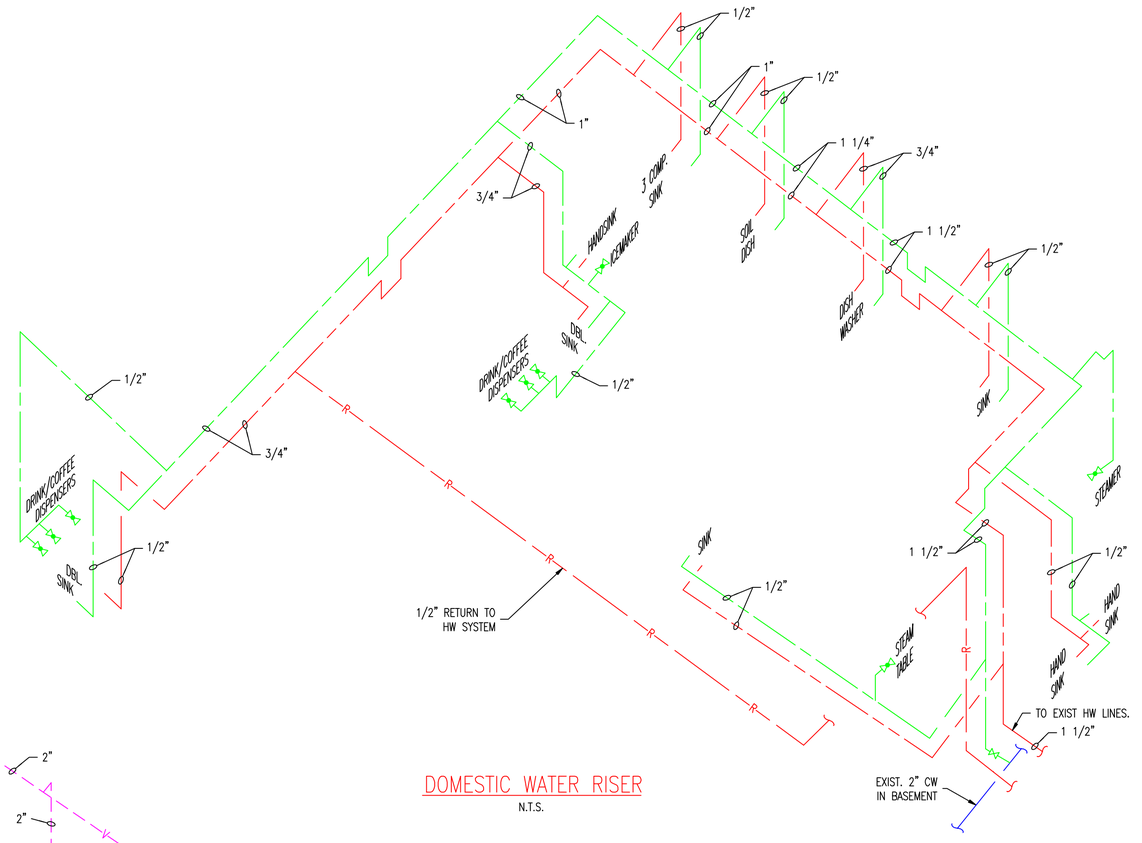
LEGEND:

SEE DWG. M1 FOR LEGEND.



SANITARY RISER

N.T.S.



DOMESTIC WATER RISER

N.T.S.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

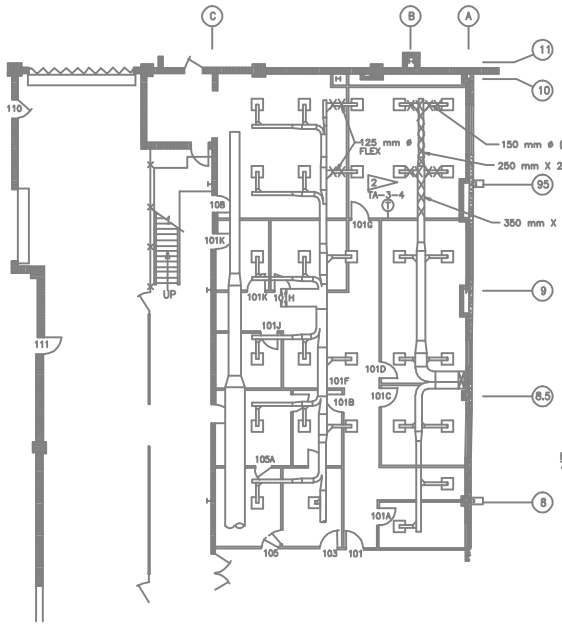
JOHN C. STENNIS SPACE CENTER
SSC, MS 39529-6000

CONTRACTOR'S NAME

FIG. 40
SAMPLE DRAWING FOR PIPING ISOMETRIC

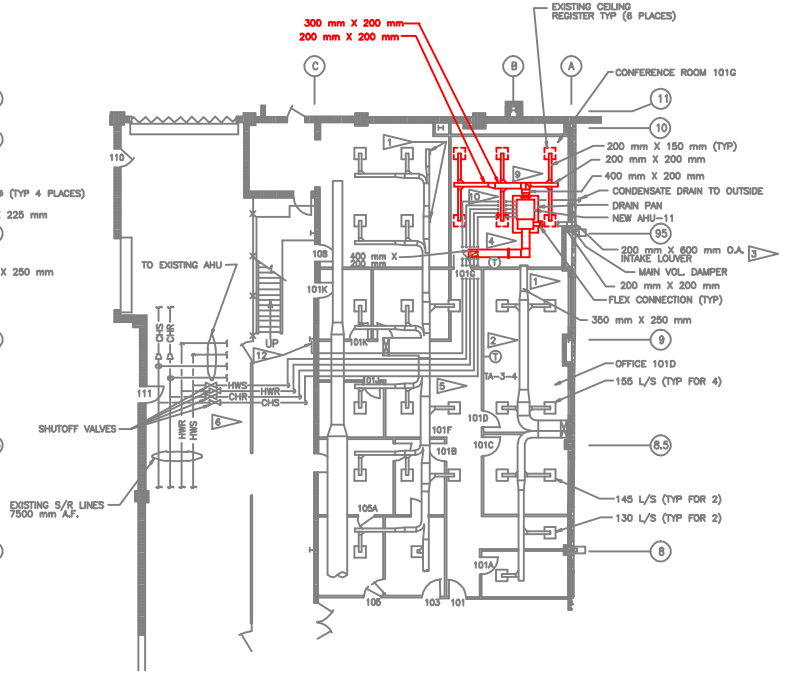
SIZE F | DWG NO. | REV.

AUTHORITY | SHEET



HVAC DEMOLITION PLAN

SCALE 1:100



HVAC MODIFICATION PLAN

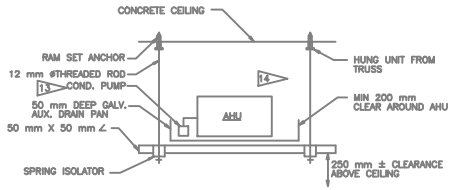
SCALE 1:100

NOTES:

1. CAP EXISTING SUPPLY DUCT WITH 24 GAGE SHEET METAL. SEAL AIRTIGHT AND INSULATE WITH 12 mm THICK DUCT WRAP INSULATION WITH VAPOR BARRIER.
2. RELOCATE EXISTING THERMOSTAT TA-3-4 FROM CONFERENCE ROOM TO ROOM 101D. INSTALL NEW THERMOSTAT FOR AHU-11 (SEE EMCS).
3. ROUTE O.A. DUCT ABOVE CEILING. PENETRATE EXTERIOR METAL WALL. SEAL PENETRATION WATER TIGHT.
4. EXACT LOCATION OF NEW 600 X 300 R.A. REGISTER IN CEILING GRID TO BE FIELD DETERMINED (USED SAME DUCTWORK AND GRILLS).
5. ROUTE 20 mm ø HWS/R, 32 mm ø CHS/R AND 20 mm ø PVC CONDENSATE DRAIN LINES ABOVE CEILING IN OFFICE AREA. INSULATE WITH 12 mm THICK INSULATION. INSTALL VAPOR BARRIER ON LINES.
6. TAP EXISTING 62 mm ø CHS/R AND 20 mm ø HWS/R LINES. INSTALL SHUT-OFF VALVE AT EACH TAP. EXISTING LINES ARE 7.5 m ABOVE FLOOR.
7. INSULATE SUPPLY RETURN, AND O.A. DUCT WITH 12 mm THICK DUCT WRAP INSULATION WITH VAPOR BARRIER.
8. INSTALL FLEXIBLE DUCT CONNECTORS TO ISOLATE NEW AHU FROM DUCTWORK.
9. BALANCE REGISTERS FOR 75 l/s.
10. SIZE INSULATED FLEX DUCTS TO MATCH EXISTING REGISTER SIZE.
11. REBALANCE REGISTERS TO L/S INDICATED.
12. CONNECT 20 mm ø CONDENSATE DRAIN LINE INTO EXISTING DRAIN 3± METERS ABOVE FLOOR. INSTALL NEW "Y" FITTING FOR CONNECTION.
13. CONDENSATE PUMP-24LPH @ 15kpa, 115V.
14. COIL CONNECTIONS, ACCESS OPENING, CONDENSATE PUMP, ELECT. CONNECTION LOCATED ON WEST SIDE OF UNIT.

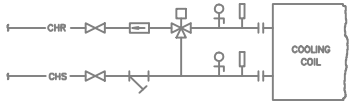
LEGEND

- EXISTING DUCTWORK TO REMAIN
- EXISTING DUCTWORK TO BE REMOVED
- NEW DUCTWORK (TAPED INTO OLD DUCTWORK)
- CHS/R — EXISTING CHILL WATER SUPPLY/RETURN
- HWS/R — EXISTING HEATING WATER SUPPLY/RETURN
- CHS/R — NEW CHILL WATER SUPPLY/RETURN
- HWS/R — NEW HEATING WATER
- GATE VALVE
- STRAINER
- GRISWOLD AUTOMATIC FLOW CONTROL VALVE
- UNION OR FLANGE
- PRESSURE GAUGE W/COCK
- THERMO-WELL W/THERMOMETER
- THREE WAY VALVE
- T — THERMOSTAT



AHU SUPPORT DIAGRAM

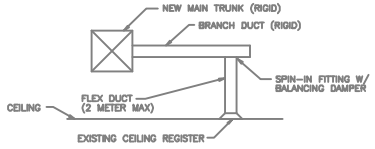
N.T.S.



COOLING COIL PIPING DIAGRAM

(HEATING COIL SIMILAR)

N.T.S.



DUCT DROP DETAIL

N.T.S.

AIR HANDLING UNIT SCHEDULE

DESIGNATION	SERVES	TYPE	FAN				COILING COIL						HEATING COIL						REMARKS
			TOTAL l/s	MIN OA l/s	EXT SP kPa	MOTOR WATTS; VOLTS; PHASE	ENT AIR °CDB/°CWB	TOTAL WATTS	ENT WATER °C	l/s	Δ t °C	MAX PD kpa	ENT AIR °C	TOTAL WATTS	ENT WATER °C	Δ t °C	l/s	MAX PD kPa	
AHU-11	CONF ROOM	FAN COIL	450	140	0.25	370; 480; 3ø	26.5/21.6	11,750	7.2	0.5	5.55	30	16.4	5,700	82.2	11.1	0.12	30	REHEAT COIL FOR HUMIDITY CONTROL CARRIER MODEL 42BH OR APPROVED EQUAL

1. WITH SS DRAIN PAN & HINGED ACCESS DOOR

THIS IS A METRIC DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT AS NOTED.

CADD CONTROLLED DRAWING

CADD P/N:

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN C. STENNIS SPACE CENTER
MS, MS 39529-6000

CONTRACTOR'S NAME

FIG. 41
SAMPLE DRAWING FOR HVAC DUCT SIZES

SIZE F | DWG NO. | REV.

AUTHORITY | SHEET

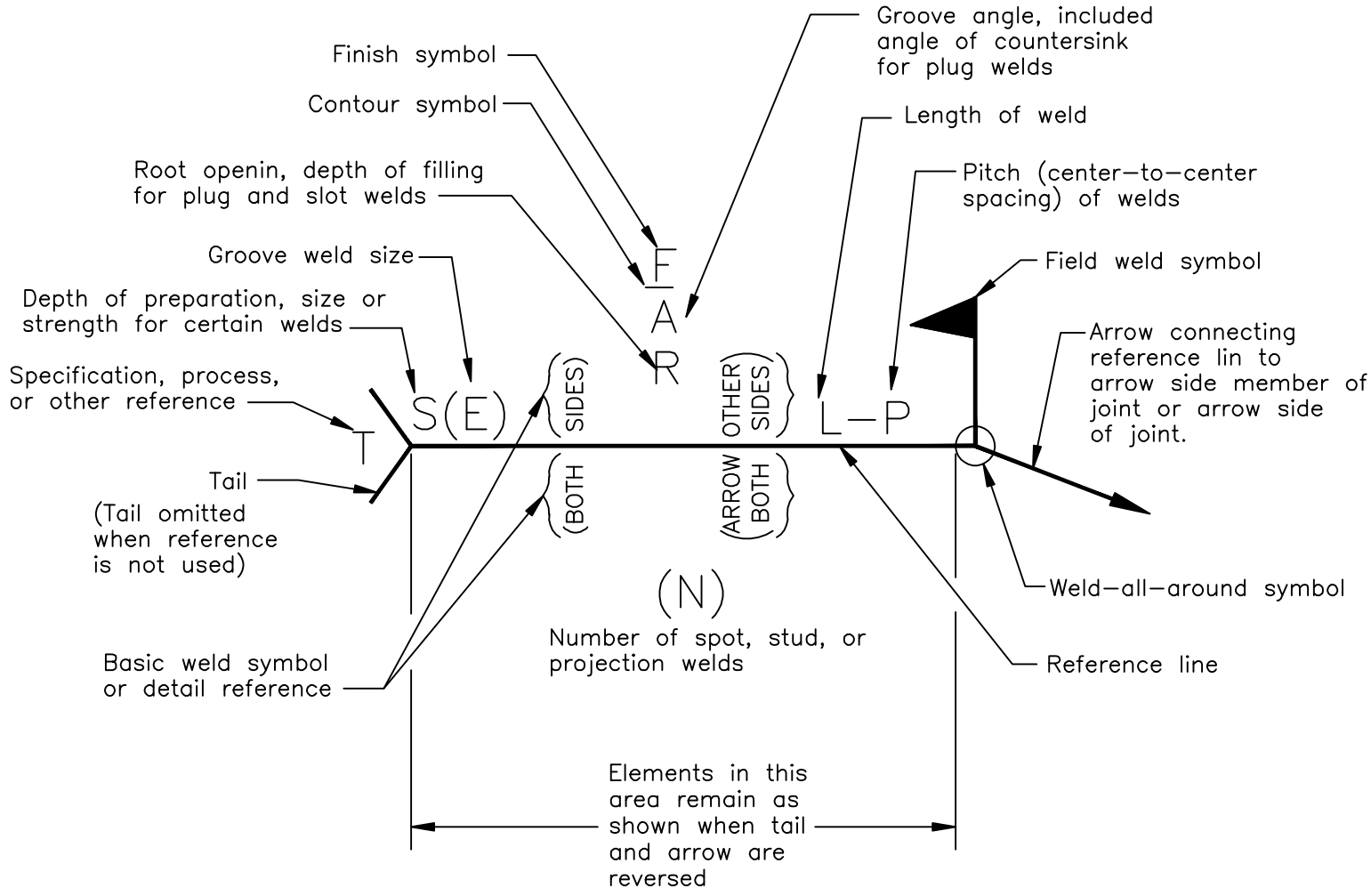
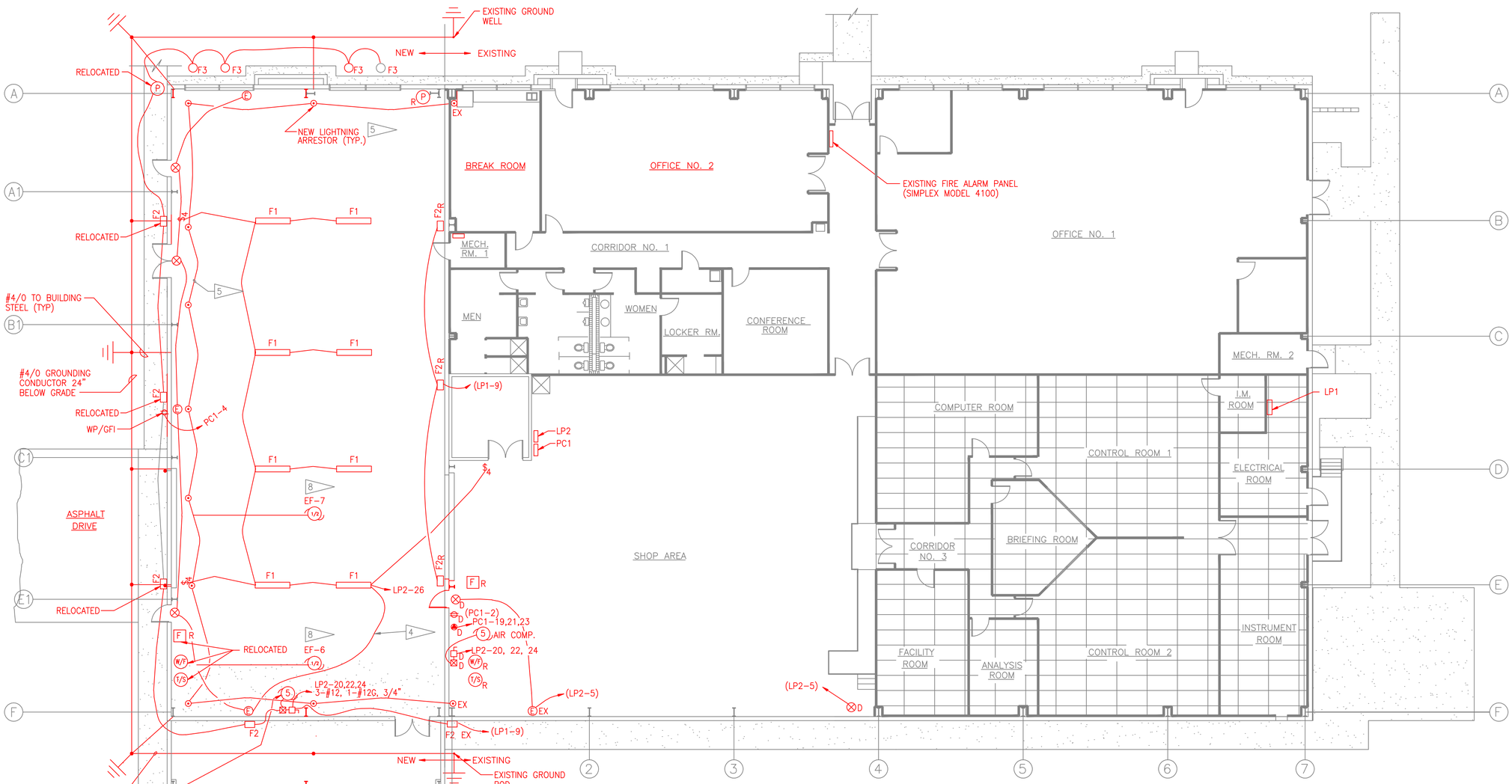


FIG. 42 – STANDARD LOCATION OF ELEMENTS OF A WELDING SYMBOL



ELECTRICAL PLAN

SCALE: 1/8"=1'-0"

— N —

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70).
2. ALL INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT) AND ALL EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED STEEL (RGS). MINIMUM SIZE SHALL BE 3/4".
3. ALL WIRING SHALL BE THWN, COPPER WITH 600 VOLT INSULATION. WIRE SIZE SHALL BE #12 UNLESS INDICATED OTHERWISE.
4. CONNECT BATTERY PACKS IN EMERGENCY FIXTURES AHEAD OF SWITCHES.
5. INSTALL LIGHTNING ARRESTORS AT BOTH CORNERS AND ALONG EDGE OF ROOF. CONNECT ALL LIGHTNING ARRESTORS AND NEW EXHAUST FANS (TYP OF 2) TOGETHER WITH #4/0 COPPER AND PROVIDE DOWN COMERS AT EACH CORNER (TYP OF 2) AND FROM ROOF PEAK (TYP OF 1). CONNECT TO GROUNDING SYSTEM. MATCH EXISTING SYSTEM AND MASTER LABEL THE ENTIRE SYSTEM. EXISTING SYSTEM WAS PROVIDED BY THOMPSON LIGHTING PROTECTION INC.
6. ALL GROUND AND LIGHTNING CONNECTIONS SHALL BE EXOTHERMICALLY WELDED.
7. USE EXISTING 20A, 1P SPARE BREAKER (RELABEL PANEL).
8. EXHAUST FANS SHALL BE INSTALLED BUT NOT ELECTRICALLY CONNECTED AS PART OF THIS PROJECT.
9. FOR DEVICES "TO BE DEMOLISHED" REMOVE WIRING AND CONDUIT BACK TO PANEL OR DEVICE FROM WHICH DEMOLISHED DEVICE WAS BEING FED FROM. SEAL ANY OPEN CONDUIT KNOCKOUTS THAT REMAIN AS A RESULT OF CONDUIT REMOVAL.
10. SEE DWG. C3 FOR NEW FLOOR PLAN.
11. REPLACE EXISTING 30A, 480V, 3P NEMA1 DISCONNECT SWITCH WITH A NEW NEMA3R SWITCH AND EXISTING NEMA1 STARTER WITH A NEW SIZE 1, 480V, 3P, IN NEMA3R ENCLOSURE WITH 120V CONTROL CIRCUIT, COVER MOUNTED START/STOP PUSHBUTTONS AND INTEGRAL PHASE LOSS PROTECTION SIEMENS MODEL NO. SXLC2120AU1J.

LEGEND:

ON ALL SYMBOLS SUBSCRIPT:

"R" – INDICATES TO BE RELOCATED
"D" – INDICATES TO BE DEMOLISHED
"EX" – INDICATES EXISTING TO REMAIN
NO SUBSCRIPT INDICATES NEW

———— – EXISTING
———— – NEW
⊕ – DUPLEX RECEPTACLE, 20A, 120V, 5-20R (WP/GFI INDICATES WEATHERPROOF GROUND FAULT INTERRUPTER)
$ – TOGGLE SWITCH, 20A, 277V "4" INDICATES FOUR WAY
– DISCONNECT SWITCH, 30A, 600V, 3P
– MOTOR STARTER
– MOTOR (NO. INDICATES HORSEPOWER)
– SPECIAL PURPOSE RECEPTACLE 208V, 3 PHASE
– EXIT SIGN, GREEN, LED WITH BATTERY BACKUP LITHONIA MODEL LES1G 120/277ELN OR EQUAL
(E) – EMERGENCY LIGHT WITH BATTERY BACKUP, LITHONIA MODEL 6ELM2 OR EQUAL
F1 – LIGHT FIXTURE – FLUORESCENT GASKETED STEM MOUNTED 15' AFF LITHONIA MODEL DMW 296H0T8AR277GEBIO OR EQUAL
F2 – LIGHT FIXTURE – 150W HPS WALL PAK MOUNTED APPROX. 8' AFF LITHONIA MODEL TWP 150S277PE OR EQUAL
F3 – DOWNLIGHT 70W/HPS MOUNTED IN OVERHANG LITHONIA MODEL LH70S277/RL-3 OR EQUAL
R F – FIRE ALARM MANUAL STATION (NON ADDRESSABLE)
(H) – FIRE ALARM HEAT DETECTOR (ADDRESSABLE)
H – FIRE ALARM HORN/STROBE
W/F – FIRE ALARM WATER FLOW SWITCH
T/S – FIRE ALARM TAMPER SWITCH
– GROUND ROD (3/4" X 10')
– LIGHTNING ARRESTOR
(P) – PHOTOCELL (APPROX. 8' A.F.F.)

PANEL SCHEDULE – LP2 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	L1 L2 L3	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
LIGHTING	231			1	20		30	2	1000			RECEPTACLE B2
LIGHTING		1792		3	20		30	4		1000		
LIGHTING			3817	5	20		30	6			1000	
RECEPTACLE B1	1000			7	30		30	8	1000			RECEPTACLE B4
		1000		9	30		30	10		1000		
			1000	11	30		30	12			1000	
SPARE	1000			13	30		30	14	1000			RECEPTACLE B5
		1000		15	30		30	16		1000		
			1000	17	30		30	18			1000	
UH-3 (5KW)	5000			19	25		15	20	1859			AIR COMP.
UH-4 (5KW)		500		21	25		15	22		1859		
UH-5 (5KW)			5000	23	25		15	24			1859	
UH-6 (5KW)	5000			25	25		20	26	1760			LIGHTING
UH-7 (7.5KW)		7500		27	35		30	28				SPARE
UH-8 (7.5KW)			7500	29	35		30	30				
POWER CENTER(PC1)	6980			31	50		30	32	5000			DUCT HEATER FOR AHU #4 (15KW)
		6980		33	50		30	34		5000		
			6980	35	50		30	36			5000	
LIGHTING	3300			37	20		20	38	1330			AHU #4 (3HP)
LIGHTING		3520		39	20		20	40		1330		
SPARE				41	20		20	42			1330	
SUB-TOTAL						G — N						SUB-TOTAL

VOLTAGE:480/277 3P.H. 4W. SIN | MAIN BUS:225 A | TOTAL WATTS, L1 36,460 | PANEL NO. LP2
MAIN BREAKER:225 A. FRAME 175 A. TRIP | TOTAL WATTS, L2 34,481
MOUNTING: SURFACE | TOTAL WATTS, L3 35,486 | LOC. PREP. AREA
NOTE: EXISTING

PANEL SCHEDULE – PC1 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	L1 L2 L3	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
RECEPTACLES	720			1	20		20	2	720			RECEPTACLES
RECEPTACLES		720		3	20		20	4		720		RECEPTACLES
RECEPTACLES			360	5	20		20	6			540	RECEPTACLES
RECEPTACLES	540			7	20		30	8	1000			RECEPTACLE A2
RECEPTACLES (EDF)		500		9	20		30	10		1000		
CRANE (1/2 HP @ 120V)			1000	11	20		30	12			1000	
RECEPTACLE A1	1000			13	30		30	14	1000			RECEPTACLE A4
		1000		15	30		30	16		1000		
			1000	17	30		30	18			1000	
SPARE				19	30		30	20	1000			RECEPTACLE A5
				21	30		30	22		1000		
				23	30		30	24			1000	
SUB-TOTAL	3260	3260	3360			G — N			3720	3720	3540	SUB-TOTAL

VOLTAGE: 208/120 3PH 4W SN | MAIN BUS: STD. A | TOTAL WATTS L1 5980 | PANEL NO. PC1
MAIN BREAKER: 50 A SECONDARY: 100 A. TRIP | TOTAL WATTS L2 5980
MOUNTING: SURFACE | TOTAL WATTS L3 5980 | LOC. PREP. AREA
NOTE: POWER CENTER WITH 30KVA XFMR – EXISTING

PANEL SCHEDULE – LP1 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	CKT. NO.	BKR. AMPS	L1 L2 L3	BKR. AMPS	CKT. NO.	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
SPARE				1	20		20	2				SPARE
LIGHTING	1,200			3	20		20	4		3700		LIGHTING
SPARE				5	20		20	6			2990	LIGHTING
LIGHTING	1,065			7	20		20	8	3305			LIGHTING
LIGHTING(OUTSIDE)	2,800			9	20		20	10		260		LIGHTING (SSB)
AHU #1	1,800		1,800	11	30		40	12			1,200	AHU #3
	1,800			13	30		40	14	1,200			
AHU #2	1,800		1,800	15	30		40	16		1,200		
	1,800			17	30		30	18			5000	DUCT HEATER FOR AHU #5 (15KW)
SPARE				19	30		30	20	5000			
SEWER LIFT STATION	14,958			21	30		30	22		5000		
	14,958			23	20		20	24				SPARE
CHP-1 (2HP)		14,958		25	100		20	26				SPARE
	903			27	100		20	28				SPARE
		903		29	15		20	30		3000		SPARE
CHP-2 (2HP)			903	31	15		20	32	3000			
	903			33	15		20	34		3000		WATER HEATER (9KW)
		903		35	15		20	36			3000	
			903	37	15		20	38	1330			AHU #5 (3HP)
	903			39	15		20	40		1330		
		903		41	15		20	42			1330	
SUB-TOTAL						G — N						SUB-TOTAL

VOLTAGE: 480/277 3P.H. 4W. SIN | MAIN BUS: 400 A. | TOTAL WATTS, L1 50,964 | PANEL NO. LP1
MAIN BREAKER: A. FRAME 300 A. TRIP | TOTAL WATTS, L2 55,054
MOUNTING:SURFACE | TOTAL WATTS, L3 47,584 | LOC. ELECT. ROOM
NOTE: EXISTING

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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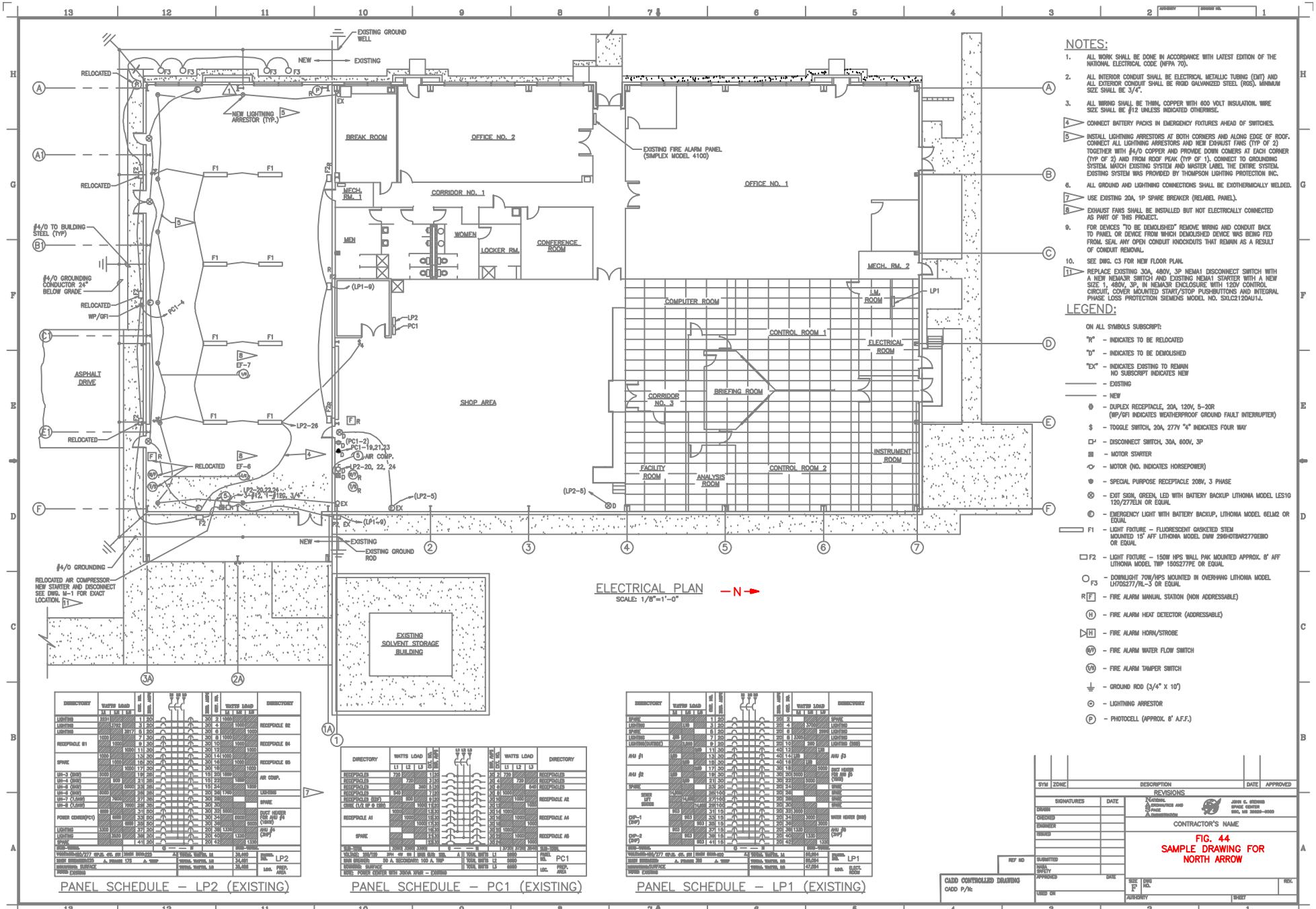
CONTRACTOR'S NAME

FIG. 43
SAMPLE DRAWING FOR ELECTRICAL LAYOUT

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



ELECTRICAL PLAN

SCALE: 1/8"=1'-0"

N

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70).
2. ALL INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT) AND ALL EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED STEEL (RGS). MINIMUM SIZE SHALL BE 3/4".
3. ALL WIRING SHALL BE THHN, COPPER WITH 600 VOLT INSULATION. WIRE SIZE SHALL BE #12 UNLESS INDICATED OTHERWISE.
4. CONNECT BATTERY PACKS IN EMERGENCY FIXTURES AHEAD OF SWITCHES.
5. INSTALL LIGHTNING ARRESTORS AT BOTH CORNERS AND ALONG EDGE OF ROOF. CONNECT ALL LIGHTNING ARRESTORS AND NEW EXHAUST FANS (TYP OF 2) TOGETHER WITH #4/0 COPPER AND PROVIDE DOWN COMERS AT EACH CORNER (TYP OF 2) AND FROM ROOF PEAK (TYP OF 1). CONNECT TO GROUNDING SYSTEM. MATCH EXISTING SYSTEM AND MASTER LABEL THE ENTIRE SYSTEM. EXISTING SYSTEM WAS PROVIDED BY THOMPSON LIGHTING PROTECTION INC.
6. ALL GROUND AND LIGHTNING CONNECTIONS SHALL BE EXOTHERMICALLY WELDED.
7. USE EXISTING 20A, 1P SPARE BREAKER (RELABEL PANEL).
8. EXHAUST FANS SHALL BE INSTALLED BUT NOT ELECTRICALLY CONNECTED AS PART OF THIS PROJECT.
9. FOR DEVICES "TO BE DEMOLISHED" REMOVE WIRING AND CONDUIT BACK TO PANEL OR DEVICE FROM WHICH DEMOLISHED DEVICE WAS BEING FED FROM. SEAL ANY OPEN CONDUIT KNOCKOUTS THAT REMAIN AS A RESULT OF CONDUIT REMOVAL.
10. SEE DWG. C3 FOR NEW FLOOR PLAN.
11. REPLACE EXISTING 30A, 480V, 3P NEMA1 DISCONNECT SWITCH WITH A NEW NEMA3R SWITCH AND EXISTING NEMA1 STARTER WITH A NEW SIZE 1, 480V, 3P, IN NEMA3R ENCLOSURE WITH 120V CONTROL CIRCUIT, COVER MOUNTED START/STOP PUSHBUTTONS AND INTEGRAL PHASE LOSS PROTECTION SIEMENS MODEL NO. SXLC2120AU1J.

LEGEND:

ON ALL SYMBOLS SUBSCRIPT:
"R" – INDICATES TO BE RELOCATED
"D" – INDICATES TO BE DEMOLISHED
"EX" – INDICATES EXISTING TO REMAIN
NO SUBSCRIPT INDICATES NEW

- EXISTING
- NEW
- DUPLEX RECEPTACLE, 20A, 120V, 5-20R (WP/GFI INDICATES WEATHERPROOF GROUND FAULT INTERRUPTER)
- $ – TOGGLE SWITCH, 20A, 277V "4" INDICATES FOUR WAY
- DISCONNECT SWITCH, 30A, 600V, 3P
- MOTOR STARTER
- MOTOR (NO. INDICATES HORSEPOWER)
- SPECIAL PURPOSE RECEPTACLE 208V, 3 PHASE
- EXIT SIGN, GREEN, LED WITH BATTERY BACKUP LITHONIA MODEL LES1G 120/277ELN OR EQUAL
- EMERGENCY LIGHT WITH BATTERY BACKUP, LITHONIA MODEL 6ELM2 OR EQUAL
- F1 – LIGHT FIXTURE – FLUORESCENT GASKETED STEM MOUNTED 15' AFF LITHONIA MODEL. DMW 296HOTBAR277GEBIO OR EQUAL
- F2 – LIGHT FIXTURE – 150W HPS WALL PAK MOUNTED APPROX. 8' AFF LITHONIA MODEL TWP 150S277PE OR EQUAL
- F3 – DOWNLIGHT 70W/HPS MOUNTED IN OVERHANG LITHONIA MODEL LH70S277/RL-3 OR EQUAL
- R F – FIRE ALARM MANUAL STATION (NON ADDRESSABLE)
- H – FIRE ALARM HEAT DETECTOR (ADDRESSABLE)
- H – FIRE ALARM HORN/STROBE
- WF – FIRE ALARM WATER FLOW SWITCH
- VS – FIRE ALARM TAMPER SWITCH
- GROUND ROD (3/4" X 10')
- LIGHTNING ARRESTOR
- P – PHOTOCELL (APPROX. 8' A.F.F.)

PANEL SCHEDULE – LP2 (EXISTING)

DIRECTORY	WATTS LOAD A	WATTS LOAD B	WATTS LOAD C	DIRECTORY
LIGHTING	2231	1	2	SPARE
LIGHTING	1728	3	4	SPARE
LIGHTING	1728	5	6	SPARE
RECEPTACLE B1	1000	7	8	LIGHTING
	1000	9	10	RECEPTACLE B2
SPARE	1000	11	12	RECEPTACLE B4
	1000	13	14	RECEPTACLE B5
	1000	15	16	RECEPTACLE B6
SPARE	1000	17	18	SPARE
UH-3 (3kW)	3000	19	20	AIR COMP.
UH-4 (3kW)	3000	21	22	
UH-5 (3kW)	3000	23	24	LIGHTING
UH-6 (3kW)	3000	25	26	
UH-7 (7.5kW)	7500	27	28	SPARE
UH-8 (7.5kW)	7500	29	30	
POWER CENTER(PC1)	6000	31	32	DUCT HEATER FOR AHU #4 (10kW)
	6000	33	34	
LIGHTING	1330	35	36	AHU #4 (3HP)
LIGHTING	1330	37	38	
SPACE		39	40	
SPACE		41	42	

VOLTAGE: 208/120 3PH 4W
MAIN BREAKER: 225 A. MAIN LUGS
MOUNTING: SURFACE
NOTES: EXISTING

TOTAL WATTS A: 38,400
TOTAL WATTS B: 34,481
TOTAL WATTS C: 38,466

PANEL NO. LP2
LOC. PREP. AREA

PANEL SCHEDULE – PC1 (EXISTING)

DIRECTORY	WATTS LOAD L1	WATTS LOAD L2	WATTS LOAD L3	DIRECTORY
RECEPTACLES	720		1152	RECEPTACLES
RECEPTACLES		720	1152	RECEPTACLES
RECEPTACLES	540		720	RECEPTACLES
RECEPTACLES (SPF)	540		810	
CRANE (1A UP @ 18ft)		0	1152	
RECEPTACLE A1	1000		1152	RECEPTACLE A2
		1000	1152	RECEPTACLE A4
SPARE			1152	RECEPTACLE A5
			1152	

VOLTAGE: 208/120 3PH 4W
MAIN BREAKER: 50 A. SECONDARY, 100 A. TRIP
MOUNTING: SURFACE
NOTES: POWER CENTER WITH 300KVA XFMR – EXISTING

TOTAL WATTS L1: 5880
TOTAL WATTS L2: 5880
TOTAL WATTS L3: 6888

PANEL NO. PC1
LOC. PREP. AREA

PANEL SCHEDULE – LP1 (EXISTING)

DIRECTORY	WATTS LOAD A	WATTS LOAD B	WATTS LOAD C	DIRECTORY
SPARE		1	2	SPARE
LIGHTING	720	3	4	LIGHTING
SPARE		5	6	SPARE
LIGHTING	540	7	8	LIGHTING
LIGHTING(OUTDOOR)	2400	9	10	LIGHTING (OUTD)
AHU #1	1728	11	12	
		13	14	AHU #3
AHU #2	1728	15	16	
		17	18	DUCT HEATER FOR AHU #3 (10kW)
SPARE		19	20	
SPARE		21	22	SPARE
SPARE LIFT STATION	1440	23	24	SPARE
		25	26	SPARE
CHP-1 (HP)	1013	27	28	SPARE
	1013	29	30	SPARE
CHP-2 (HP)	1013	31	32	WATER HEATER (6kW)
	1013	33	34	
		35	36	AHU #5 (3HP)
		37	38	
		39	40	
		41	42	

VOLTAGE: 208/120 3PH 4W
MAIN BREAKER: A. 225AMP
MOUNTING: SURFACE
NOTES: EXISTING

TOTAL WATTS A: 69,084
TOTAL WATTS B: 69,084
TOTAL WATTS C: 47,284

PANEL NO. LP1
LOC. ELECT. ROOM

PANEL SCHEDULE – LP1 (EXISTING)

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN C. STENNIS SPACE CENTER
MSS, MS 39529-6000

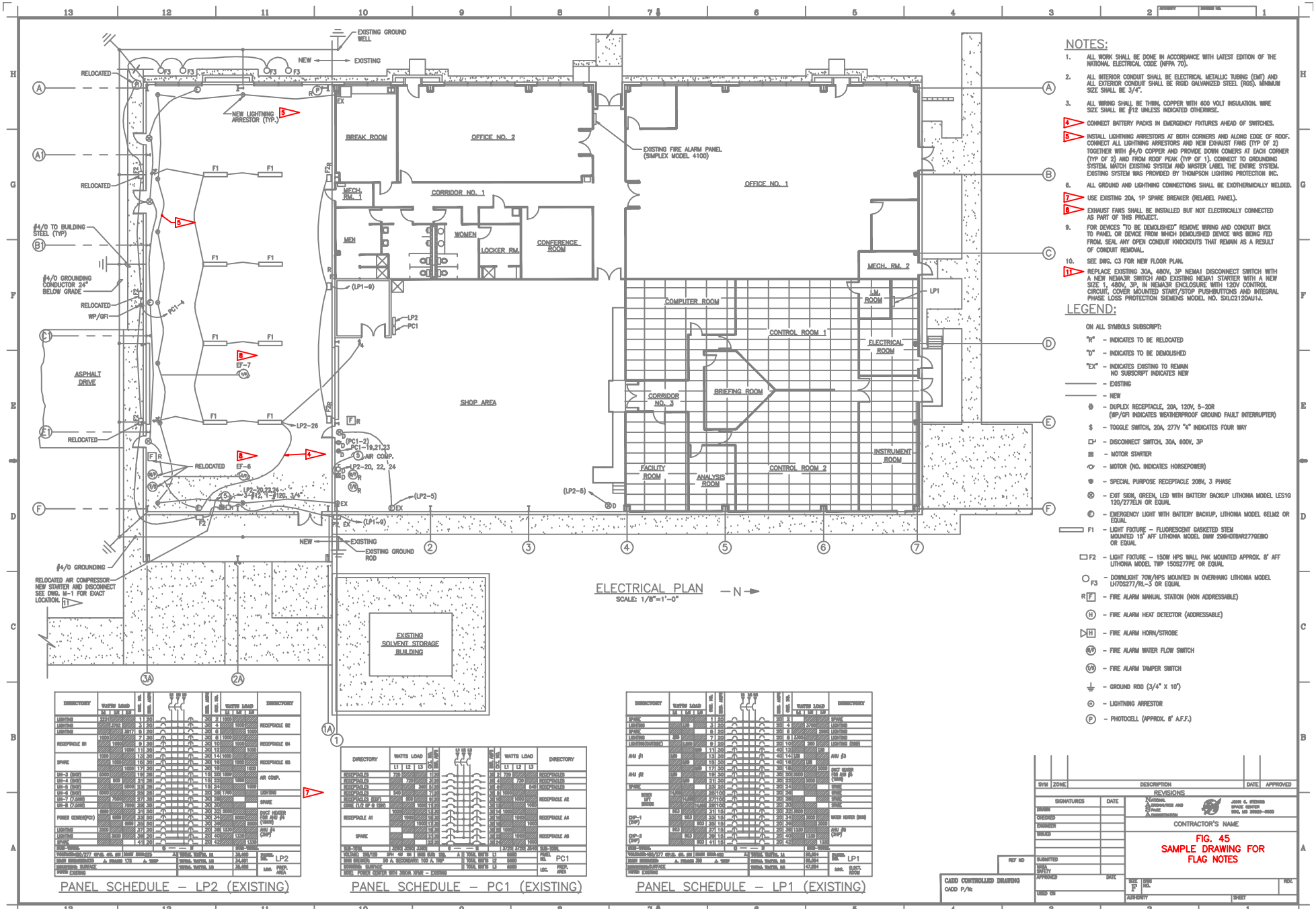
CONTRACTOR'S NAME

FIG. 44
SAMPLE DRAWING FOR NORTH ARROW

REF NO

CADD CONTROLLED DRAWING
CADD P/N:

SIZE F | DWG NO. | REV.
AUTHORITY | SHEET



ELECTRICAL PLAN — N
SCALE: 1/8"=1'-0"

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70).
2. ALL INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT) AND ALL EXTERIOR CONDUIT SHALL BE RIGID GALVANIZED STEEL (RGS). MINIMUM SIZE SHALL BE 3/4".
3. ALL WIRING SHALL BE THHN, COPPER WITH 600 VOLT INSULATION. WIRE SIZE SHALL BE #12 UNLESS INDICATED OTHERWISE.
4. CONNECT BATTERY PACKS IN EMERGENCY FIXTURES AHEAD OF SWITCHES.
5. INSTALL LIGHTNING ARRESTORS AT BOTH CORNERS AND ALONG EDGE OF ROOF. CONNECT ALL LIGHTNING ARRESTORS AND NEW EXHAUST FANS (TYP OF 2) TOGETHER WITH #4/0 COPPER AND PROVIDE DOWN COMERS AT EACH CORNER (TYP OF 2) AND FROM ROOF PEAK (TYP OF 1). CONNECT TO GROUNDING SYSTEM. MATCH EXISTING SYSTEM AND MASTER LABEL THE ENTIRE SYSTEM. EXISTING SYSTEM WAS PROVIDED BY THOMPSON LIGHTING PROTECTION INC.
6. ALL GROUND AND LIGHTNING CONNECTIONS SHALL BE EXOTHERMICALLY WELDED.
7. USE EXISTING 20A, 1P SPARE BREAKER (RELABEL PANEL).
8. EXHAUST FANS SHALL BE INSTALLED BUT NOT ELECTRICALLY CONNECTED AS PART OF THIS PROJECT.
9. FOR DEVICES "TO BE DEMOLISHED" REMOVE WIRING AND CONDUIT BACK TO PANEL OR DEVICE FROM WHICH DEMOLISHED DEVICE WAS BEING FED FROM. SEAL ANY OPEN CONDUIT KNOCKOUTS THAT REMAIN AS A RESULT OF CONDUIT REMOVAL.
10. SEE DWG. C3 FOR NEW FLOOR PLAN.
11. REPLACE EXISTING 30A, 480V, 3P NEMA1 DISCONNECT SWITCH WITH A NEW NEMA3R SWITCH AND EXISTING NEMA1 STARTER WITH A NEW SIZE 1, 480V, 3P, IN NEMA3R ENCLOSURE WITH 120V CONTROL CIRCUIT, COVER MOUNTED START/STOP PUSHBUTTONS AND INTEGRAL PHASE LOSS PROTECTION SIEMENS MODEL NO. SXLC2120AU1J.

LEGEND:

ON ALL SYMBOLS SUBSCRIPT:
"R" – INDICATES TO BE RELOCATED
"D" – INDICATES TO BE DEMOLISHED
"EX" – INDICATES EXISTING TO REMAIN
NO SUBSCRIPT INDICATES NEW

- EXISTING
- NEW
- DUPLEX RECEPTACLE, 20A, 120V, 5-20R (WP/GFI INDICATES WEATHERPROOF GROUND FAULT INTERRUPTER)
- TOGGLE SWITCH, 20A, 277V "4" INDICATES FOUR WAY
- DISCONNECT SWITCH, 30A, 600V, 3P
- MOTOR STARTER
- MOTOR (NO. INDICATES HORSEPOWER)
- SPECIAL PURPOSE RECEPTACLE 208V, 3 PHASE
- EXIT SIGN, GREEN, LED WITH BATTERY BACKUP LITHONIA MODEL LES1G 120/277ELN OR EQUAL
- EMERGENCY LIGHT WITH BATTERY BACKUP, LITHONIA MODEL 6ELM2 OR EQUAL
- F1 – LIGHT FIXTURE – FLUORESCENT GASKETED STEM MOUNTED 15' AFF LITHONIA MODEL. DMW 296HOTBAR277GEBIO OR EQUAL
- F2 – LIGHT FIXTURE – 150W HPS WALL PAK MOUNTED APPROX. 8' AFF LITHONIA MODEL TWP 150S277PE OR EQUAL
- F3 – DOWNLIGHT 70W/HPS MOUNTED IN OVERHANG LITHONIA MODEL LH70S277/RL-3 OR EQUAL
- R F – FIRE ALARM MANUAL STATION (NON ADDRESSABLE)
- H – FIRE ALARM HEAT DETECTOR (ADDRESSABLE)
- H – FIRE ALARM HORN/STROBE
- WF – FIRE ALARM WATER FLOW SWITCH
- VS – FIRE ALARM TAMPER SWITCH
- GROUND ROD (3/4" X 10')
- LIGHTNING ARRESTOR
- P – PHOTOCELL (APPROX. 8' A.F.F.)

PANEL SCHEDULE – LP2 (EXISTING)

PANEL SCHEDULE – PC1 (EXISTING)

PANEL SCHEDULE – LP1 (EXISTING)

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

SIGNATURES / DATE: DRAWN, CHECKED, ENGINEER, ISSUED, SUBMITTED, NASA SAFETY, APPROVED, USED ON

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CONTRACTOR'S NAME

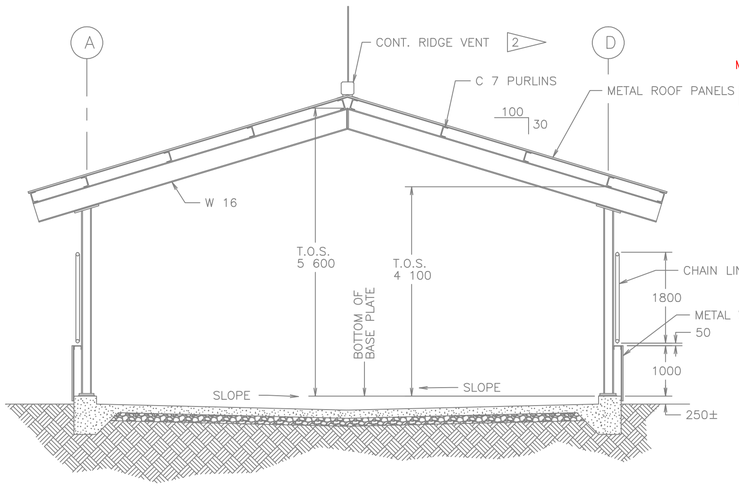
FIG. 45
SAMPLE DRAWING FOR FLAG NOTES

REF NO

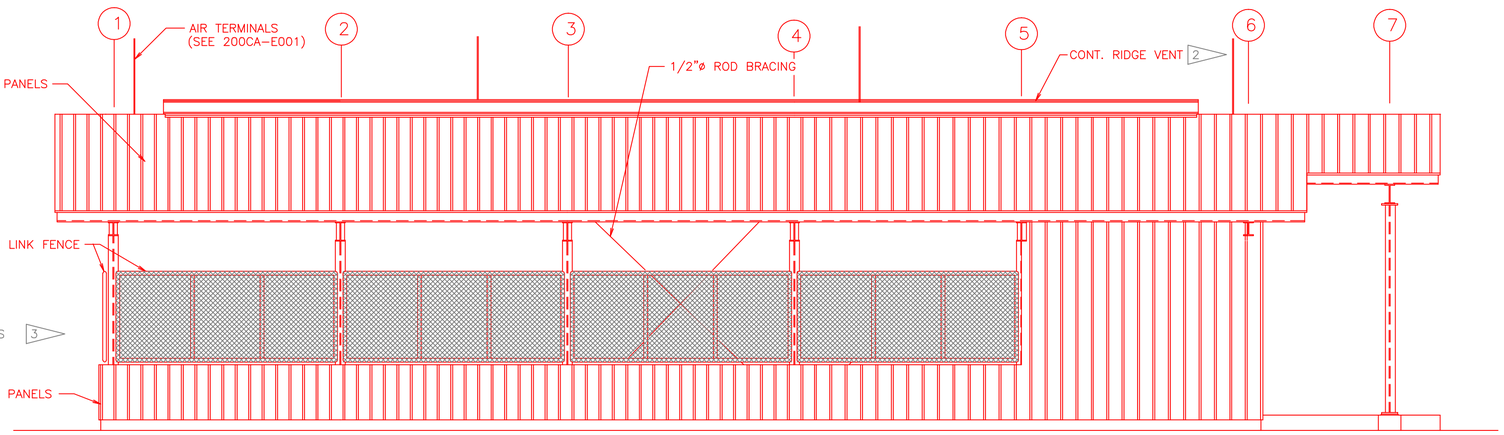
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CADD P/Nr

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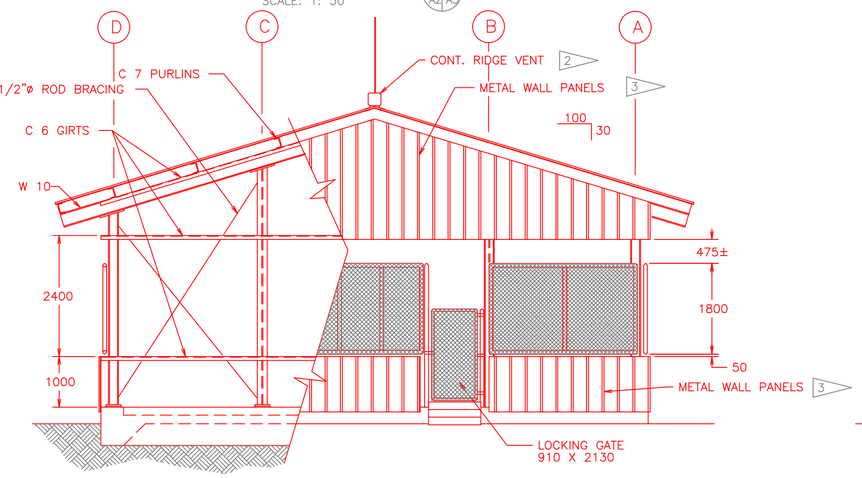
AUTHORITY | SHEET



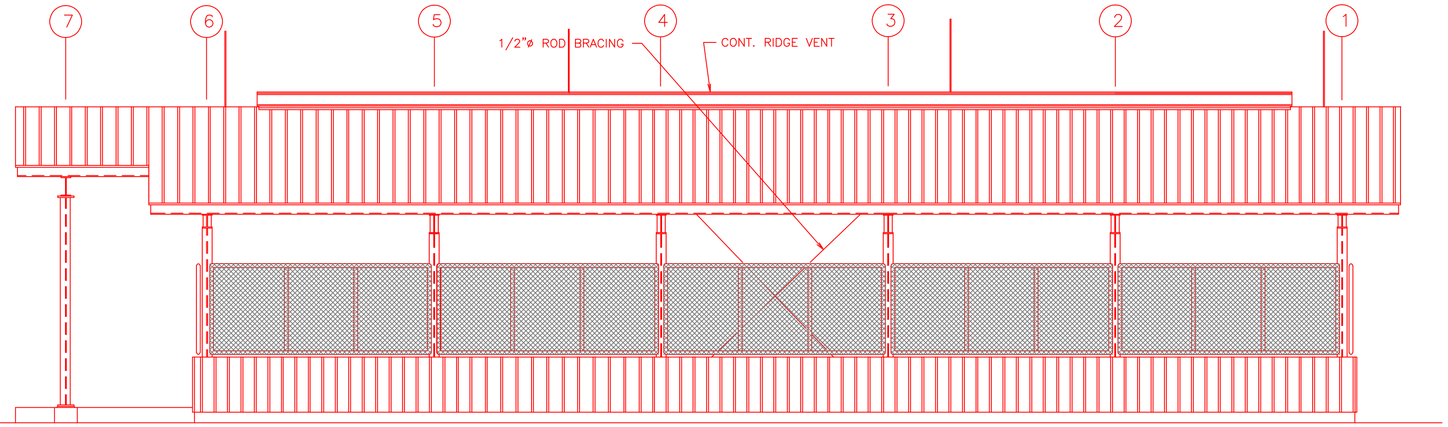
SECTION
SCALE: 1: 50
C
A2 A3



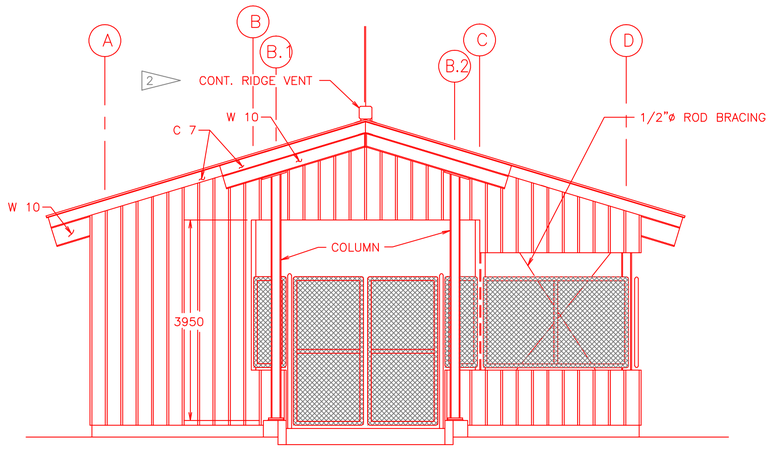
ELEVATION
SCALE: 1: 50
D
A2 A3



ELEVATION
SCALE: 1: 50
E
A2 A3



ELEVATION
SCALE: 1: 50
F
A2 A3



ELEVATION
SCALE: 1: 50
G
A2 A3

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. CONTINUOUS METAL RIDGE VENT THYCURB OR APPROVED EQUAL.
3. ROOF & SIDING SHALL BE OF ARCHITECTURAL PROFILE 1 1/2" ENAMEL COATED GALVANIZED 22 GAGE STEEL.

THIS IS A METRIC DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT AS NOTED.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

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CADD P/N:

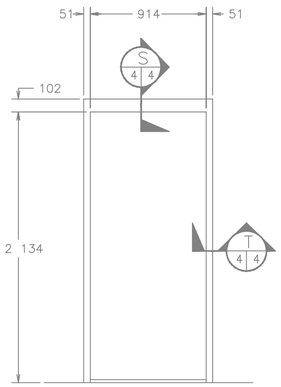
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CONTRACTOR'S NAME

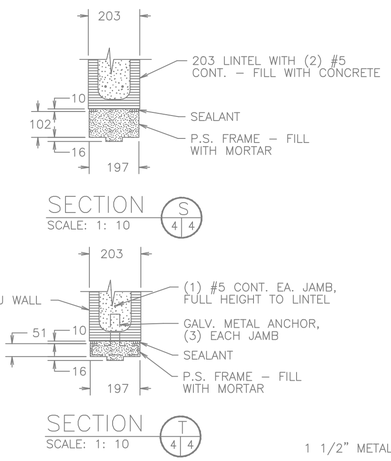
FIG. 46
SAMPLE DRAWING FOR ELEVATIONS

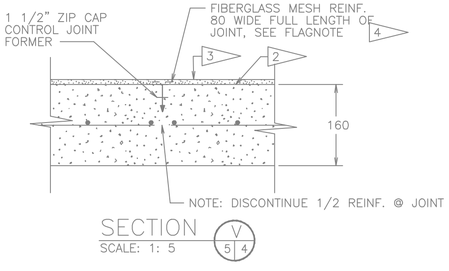
SIZE	DWG NO.	REV.
F		

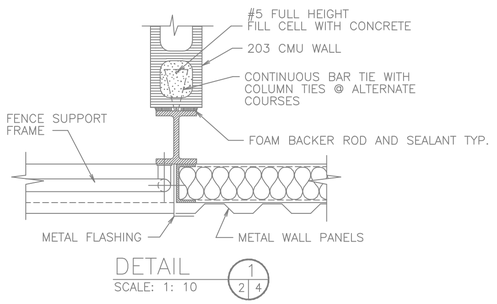
AUTHORITY | SHEET

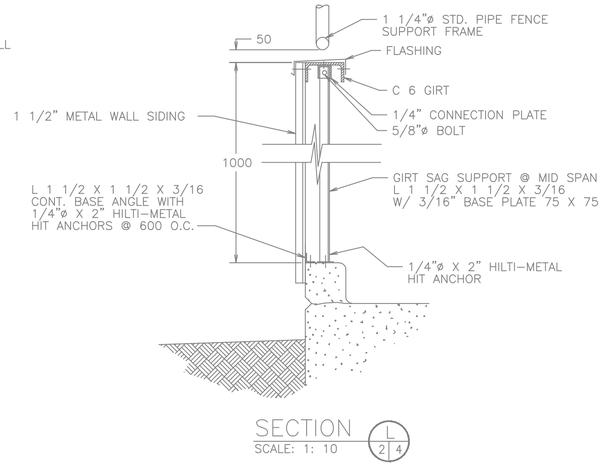


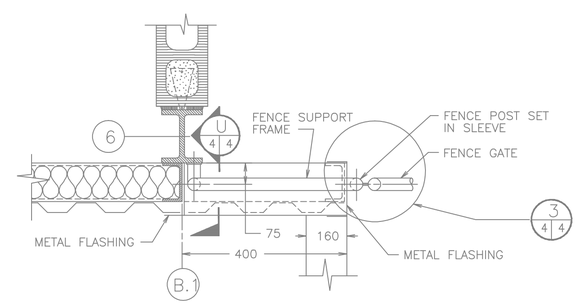
DOOR ELEVATION
NOT TO SCALE

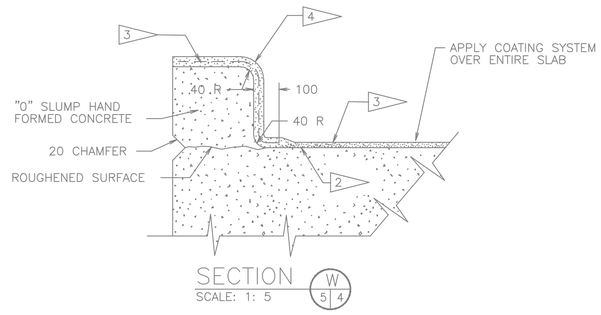






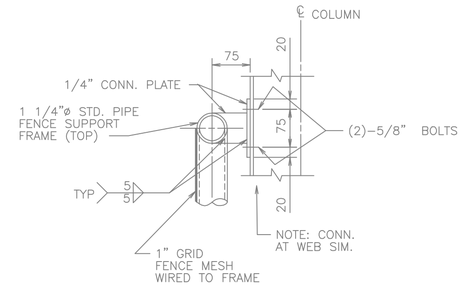




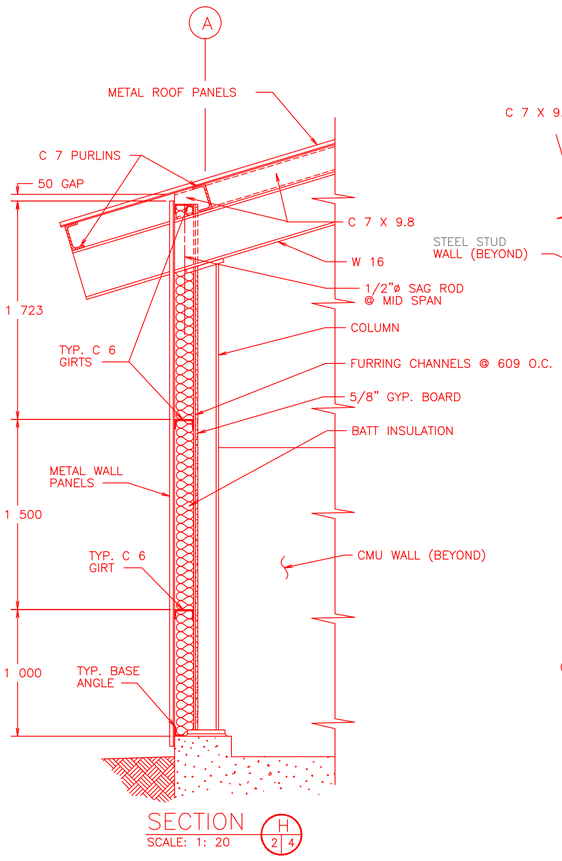


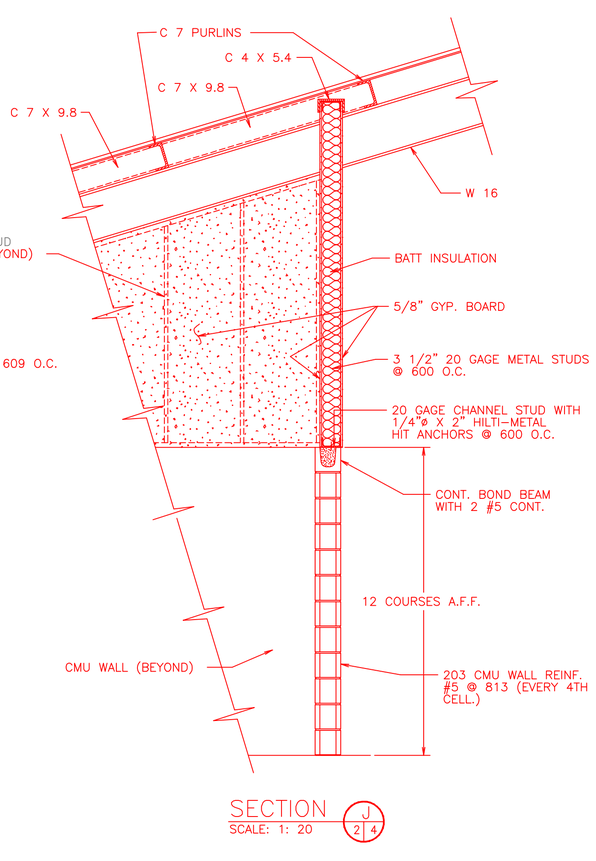
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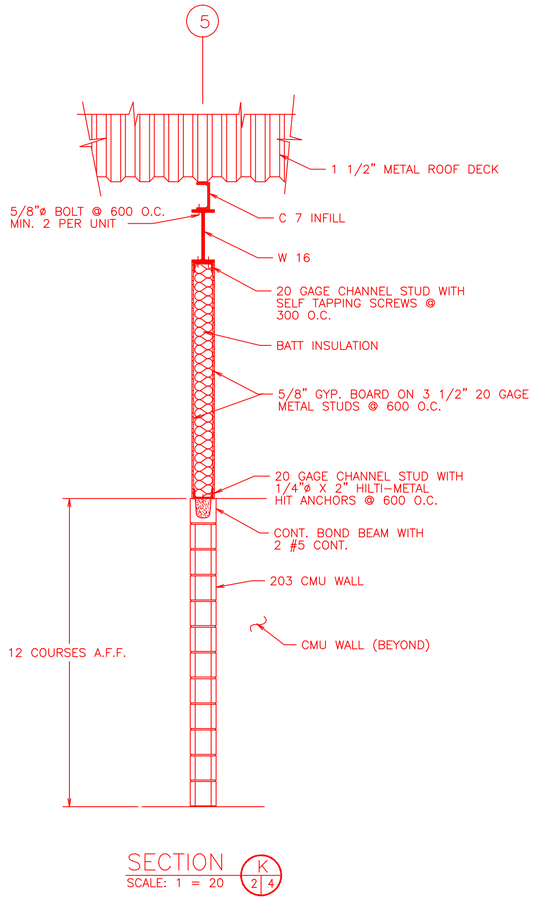
1. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PREPARE CONCRETE BY USING "SHOT BLAST" METHOD OR OTHER APPROVED METHOD FOR VERTICAL APPLICATIONS AS RECOMMENDED BY THE MFGR. TO PROVIDE 10–12 MIL. SURFACE PROFILE.
3. COATING SYSTEM SHALL CONSIST OF 4 COATS AS FOLLOWS:
   (A) FIRST COAT OF DUR–A–GLAZE #4 CR–1 100% SOLIDS EPOXY SHALL BE APPLIED TO A MINIMUM THICKNESS OF 10 MILS.
   (B) ALUMINUM OXIDE SHALL BE BROADCAST UNIFORMLY FOR TRACTION.
   (C) SECOND COAT OF DUR–A–GLAZE #4 CR–1 SHALL BE APPLIED TO A MINIMUM THICKNESS OF 10 MILS.
   (D) TWO COATS OF CLEAR POLYTHANE SHALL BE APPLIED PER MFGR. RECOMMENDATIONS.
4. FIBERGLASS MESH REINFORCEMENT PLACED AFTER FIRST COAT OF DUR–A–GLAZE #4 CR–1 HAS BEEN APPLIED PER MFGR. RECOMMENDATIONS. OMIT ALUMINUM OXIDE FOR VERTICAL APPLICATIONS.

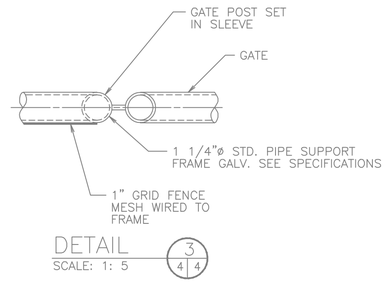


5









SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
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ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
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USED ON	

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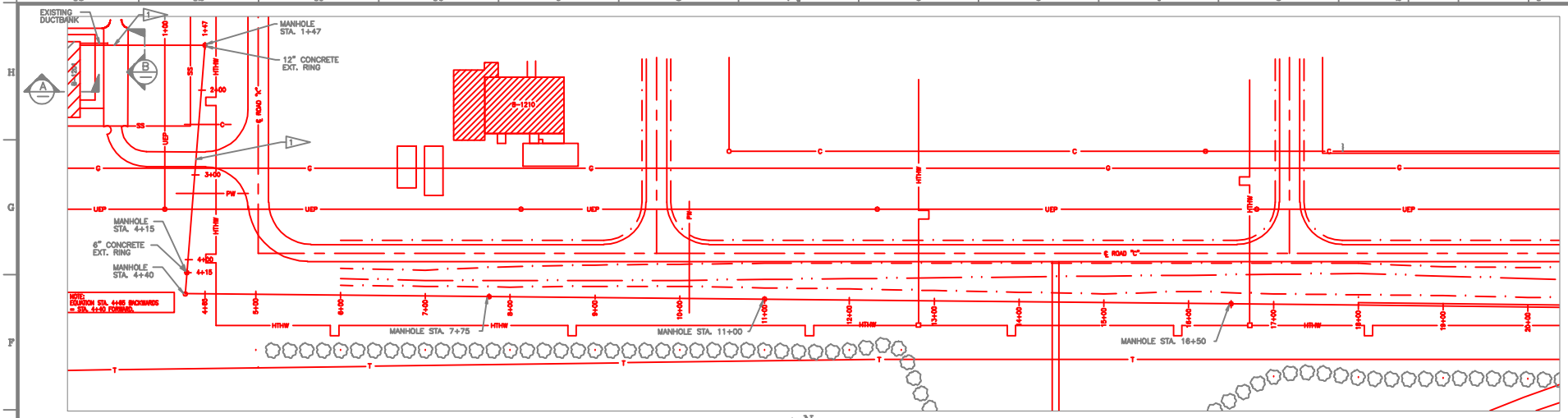
FIG. 47
SAMPLE DRAWING FOR FRAMING SECTIONS

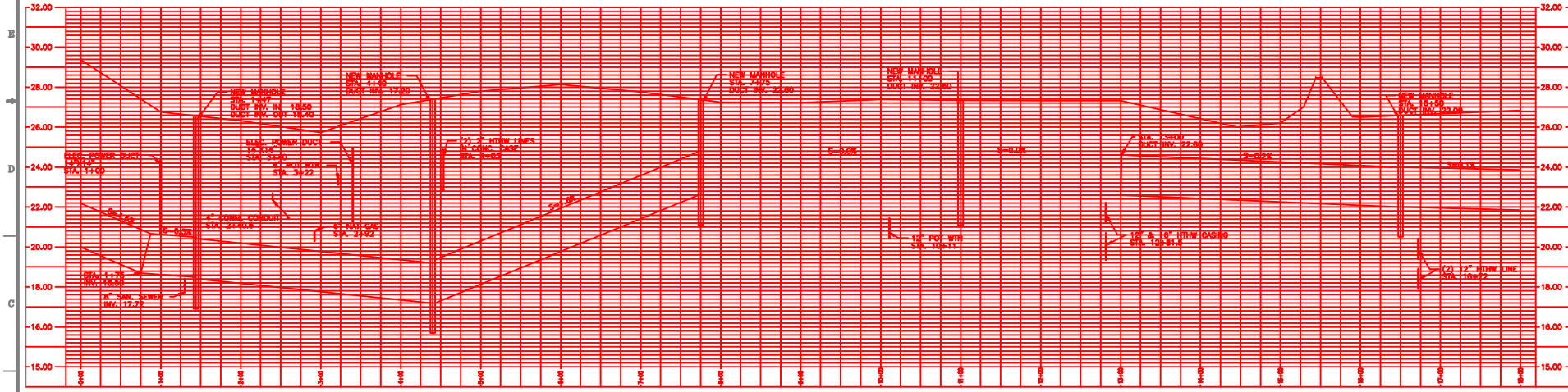
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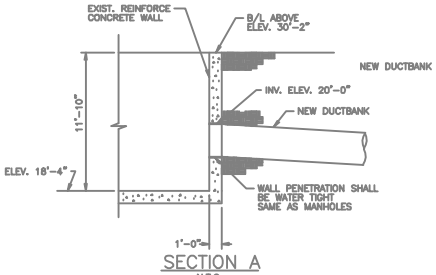
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SIZE F | DWG NO. | REV.

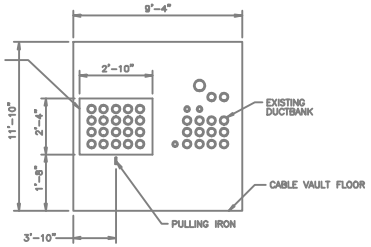
AUTHORITY | SHEET







SECTION A
N.T.S.



SECTION B
N.T.S.

PROFILE

HORIZONTAL SCALE:1"=50'
VERTICAL SCALE:1/2"=1'-0"

LEGEND: TYPICAL DOCUMENTS 3,4,5

C	EXISTING COMMUNICATIONS DUCT
G	EXISTING GAS LINE
T	EXISTING UNDERGROUND TELEPHONE LINE
SS	EXISTING SANITARY SEWER LINE
GN	EXISTING GASEOUS NITROGEN LINE
RP-1	EXISTING ROCKET PROPELLANT LINE
PW	EXISTING POTABLE WATER LINE
UEP	EXISTING UNDERGROUND ELECTRICAL POWER
HTHW	EXISTING HIGH TEMPERATURE HOT WATER LINE
O/H E	EXISTING OVER-HEAD ELECTRICAL LINE
	CENTERLINE OF EXISTING DITCH
	TOP OF EXISTING DITCH BANK

NOTE
FOR BID ITEM WORK CONTENT SEE DOC #1

NOTES:

1. PAVED AREAS SHALL BE RESTORED TO ORIGINAL CONDITION.
2. INSTALL SPACERS TO HOLD UP THE 4" CONDUIT FROM SAGGING AND PULLING APART AS REQUIRED.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
NASA SAFETY	
APPROVED	DATE
USED ON	

REF NO

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FIG. 48
SAMPLE DRAWING FOR PLAN AND PROFILE

SIZE F | DWG NO. | REV 1

AUTHORITY | SHEET

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 10

Stennis Space Center
Physical Security

Physical Security Requirements for NASA Facilities and Property

Only provided in electronic format

NASA Procedural Requirements

NPR 1620.3
Effective Date: August 12, 2004
Expiration Date: August 12, 2009

COMPLIANCE IS MANDATORY

Physical Security Requirements for NASA Facilities and Property

Responsible Office: Office of Security & Program Protection

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3.12 Rocket Engine, Wind Tunnels, Simulators, and Other High-Speed Testing Facilities and Equipment
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3.14 Animal Research Facilities and Associated Laboratories
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Preface

P.1 Purpose.

This NPR outlines physical security requirements and responsibilities for safeguarding NASA assets. Its objectives are to:

a. Establish standardized physical security requirements for specific categories of NASA assets.

b. Base physical security requirements on an established physical security vulnerability risk assessment process, outlined in NPR 1620.2, "NASA Physical Security Vulnerability Risk Assessments," that allows Center management the flexibility to 1). Prioritize assets based on their risk level and criticality to the overall mission and, 2). Tailor risk level 2 and 3 security requirements to meet local needs provided that risk level 1 or other more appropriate compensatory physical security enhancements have been implemented. Risk level definitions are as follows:

1). Risk Level I - Assignment of this risk level designation indicates that the asset has been appropriately assessed and, due to its criticality and attractiveness, determined to be at the lowest level of risk for threat by criminals, terrorists, protestors, or other aggressors.

2). Risk Level II - Assignment of this risk level designation indicates that the asset has been appropriately assessed and, due to its criticality and attractiveness, determined to be at the mid-level of risk for threat by criminals, terrorists, protestors, or other aggressors.

(3). Risk Level III - Assignment of this risk level designation indicates that the asset has been appropriately assessed and, due to its criticality and attractiveness, determined to be at the highest level of risk for threat by criminals, terrorists, protestors, or other aggressors.

c. Reduce loss, theft, misuse, and damage of NASA assets cost effectively.

P.2 Applicability

This NPR is applicable to NASA Headquarters and NASA Centers, including Component Facilities, to the Jet Propulsion Laboratory (JPL), and NASA contractors to the extent specified in their contracts. Address comments regarding this NPR to the Director, Security Management Office (DSMO), Office of Security Management and Safeguards, NASA Headquarters, Washington, DC, 20546. Refer questions concerning the application of these requirements to specific NASA Centers to the appropriate NASA Center Security Office.

P.3 Authority

a. 42 U.S.C., Section 2473(c)(1), National Space Program.

b. NASA Policy Directive 1600.2C, NASA Security Policy.

P.4 References

a. 14 CFR, Section 1203, National Aeronautics and Space Administration.

b. NASA Procedural Requirements (NPR) 1600.1, NASA Security Program Procedural Requirements.

c. NPR 1600.2, Physical Security Vulnerability Risk Assessments

d. NPR 4200.1, NASA Equipment Manual

e. NPR 4310.1, Identification and Disposition of NASA Artifacts

f. Presidential Decision Directive (PDD) 62, Combating Terrorism

g. Homeland Security Presidential Directive (HSPD) 7, Critical Infrastructure Identification, Prioritization, and Protection.

h. Government Accounting Office (GAO) - 02-95, Vulnerability Assessment of Federal Facilities, October 1995.

i. GAO - 03-08, Building Security - Security Responsibilities for Federally Owned and Leased Facilities, October 2002.

j. PDD 67, Enduring Constitutional Government and Continuity of Government Operations.

k. PDD 62, Countering Terrorism.

l. NPR 8820.2, NASA Construction of Facilities Procedural Requirements.

P.5 Cancellation

None

/S/
David A. Saleeba
Assistant Administrator
Office of Security and Program Protection

CHAPTER 1: General

1.1 Responsibilities

1.1.1. The Assistant Administrator, Office of Security Management and Safeguards (AA/OSMS), Code X, shall:

a. Provide overall policy direction and procedural requirements for the physical security of NASA assets (critical and non-critical).

b. Coordinate with Institutional Program Offices (IPO) and Center Directors, as necessary, to ensure appropriate application of established physical security policy, procedures, and requirements pertaining to the protection of NASA assets.

1.1.2. Center Directors shall:

a. Ensure Center security personnel conduct the appropriate physical security vulnerability risk assessment for all assets under their control in a timely manner.

b. Ensure senior management officials at their respective Center implement physical security measures commensurate with the requirements established in this NPR.

1.1.3. Center Chiefs of Security shall:

a. To the extent possible, ensure a physical security vulnerability risk assessment is conducted for all assets under their control in a timely manner. At a minimum, all Minimum Essential Infrastructure (MEI) assets, as defined in NPR 1600.1, NASA Security Program Procedural Requirements, shall be subject to the appropriate security vulnerability risk assessment immediately upon designation as critical infrastructure and/or key resource.

b. Ensure the physical security measures identified in this NPR are implemented as soon as practical, after funding is identified through the budgetary process.

c. As appropriate and required, notify the NASA Office of Inspector General of all crimes at NASA owned and/or leased facilities, to include theft or misuse of, or damage to, Government property.

1.1.4. Organizational Heads shall control and safeguard all property within their activity. They shall:

a. Promptly report to the Center law enforcement/security organization, and assist in any investigative activity and resolve incidents involving loss, theft, misuse, or damage of NASA resources.

b. Establish end-of-day security checks using Standard Form (SF) 701 (Activity Security Checklist) when storing classified or sensitive but unclassified information and material.

c. Implement security measures commensurate with the results of the physical security vulnerability

risk assessment conducted by Center security personnel.

1.1.5. Organizations involved in logistic and supply operations shall protect supplies and equipment as indicated in this NPR.

1.1.6. Facility Security Managers shall ensure periodic physical security inspections are conducted per local Center security policies and procedures.

1.1.7. Organizations assigned custody of controlled medical substances shall implement measures to safeguard them as required by this NPR. These responsibilities include:

a. Ensuring physical security responsibilities are fixed in the receipt, storage, issue, transportation, use, disposal, turn-in, and accounting for all controlled medical substances and sensitive items.

b. Providing specific security instructions to individuals who are in the possession and control of, or who are responsible for, controlled medical substances and sensitive items.

c. Ensuring the careful selection of personnel, including volunteer workers, who are assigned duties that require access to controlled medical substances and sensitive items storage areas or who have custodianship or possession of keys and combinations to locks securing these areas.

d. Taking action to deny access to controlled substances by individuals undergoing investigation, treatment, rehabilitation, or administrative action as a result of actual or suspected drug abuse or as a result of suspected illegal activity involving controlled drugs (for example, theft, wrongfully prescribing, and inventory manipulation.)

e. Establishing appropriate escort procedures and designating escort personnel, by name or duty position, to escort unauthorized people into storage areas.

f. Ensuring a Facility Security Coordinator (FSC) is appointed, in writing, by the medical facility manager to assure that appropriate protection is provided for all controlled medical substances and sensitive items.

1.2 Security Measures And Requirements

a. Physical security measures more stringent than those contained in this NPR may be implemented by a Center official based on the criticality or "value" of the asset under consideration, analysis of local threat, identified vulnerabilities, and available security resources. These measures shall be incorporated into the Center's physical security plan as an annex or as a mission specific security plan.

b. Provisions for security program funding shall be included in normal budget deliberations. Tenant activities shall coordinate their security program status, and when appropriate, security requirements to the host installation, so support may be provided at reimbursable cost, as appropriate.

c. Provision of security measures beyond those required by this NPR and other NASA procedural requirements shall be determined on a case-by-case basis by the Center Chief of Security (CCS).

1.3 Physical Security Measures for Stand-Alone Facilities or Facilities Located in Foreign Countries

1.3.1. Stand-alone or single facilities not located on U.S. Government installations or situated in foreign countries shall be secured as indicated below:

(1) Use of NASA photo-identification to facilitate entry of authorized personnel.

(2) Use of a centrally managed electronic access control system and integrated video surveillance to facilitate access for authorized personnel and provide real time feedback on suspicious activity.

(3) Installation of firearms, explosives, and nuclear/biological/chemical detection capability at visitor entry points.

(4) Centralized mail/shipping and receiving activity equipped with package screening capability.

(5) Entry points manned by qualified security personnel.

(6) Visitor reception and processing office.

1.3.2. When part of a multi-facility complex that is external to a NASA Center, including in an overseas environment, the measures outlined in paragraph 1.3.1, above, Risk Level II procedures outlined in section 3.19, and terrorism counter-measures outlined in section 3.20, shall be implemented to the extent appropriate, as determined by a physical security vulnerability risk assessment, postulated threat, and any international agreements.

1.4 Risk Management and Risk Acceptance Process

1.4.1. Management and security may disagree on the level of security required for a particular asset. When management disagrees on the level of security required, they may opt to acknowledge and accept the risk of implementing less stringent security measures than those required through the risk assessment process established in NPR 1620.2, NASA Physical Security Vulnerability Risk Assessment, provided the asset is not a national security asset. In the case of a national security asset, only the Assistant Administrator for Security Management and Safeguards may accept the risk.

1.4.2. Every effort will be made to resolve the differences at the Center level. Management will:

a. Document their position regarding the required security measures, and outline their recommended alternative approach.

b. Include any pertinent information, including an acknowledgement of risk.

c. Submit to the Center Chief of Security, who will review and concur/non-concur, as appropriate.

e. If concurrence is given, no further action is necessary. A copy of all documentation will be maintained at the Center security office.

f. If the review results in a nonconcurrence, the security office must provide appropriate rationale and justification for the nonconcurrence.

g. If an agreement between the security office and management cannot be reached, the issue must be presented to the appropriate senior management for resolution.

3.5.2. When senior management cannot resolve the impasse, or when the issue involves a national security asset, a request for waiver or exception of requirements must be processed in accordance with section 1.3, Chapter 1, NPR 1600.1, NASA Security Program Procedural Requirements.

1.5 Terms, Abbreviations, and Acronyms

Terms, abbreviations, and acronyms used in this NPR are explained in Chapter 10 of the parent

document, NPR 1600.1, NASA Security Program Procedural Requirements.

CHAPTER 2: Physical Security Vulnerability Risk Assessments

2.1 General

2.1.1. To provide the most practical physical protection for NASA assets, NASA managers must identify their mission essential critical assets and analyze the risks to those assets from damage and/or destruction from espionage, sabotage, terrorism, misuse, and theft.

2.1.2. Assessment of these risks shall assist in determining the type and minimum level of physical protection needed to safeguard the identified MEI resources adequately and economically. The objectives of a physical security vulnerability risk analyses are the following:

a. Provide NASA managers a tool with which to design a security program based on local needs.

b. Allow the flexibility to adapt risk level 2 and 3 physical security measures, as appropriate, to meet local risk conditions, provided risk level 1 or comparable security measures are in place and effective. In asset categories where physical security requirements have only been set at the higher risk levels, Center Security Offices shall develop minimum physical security requirements that provide for the appropriate level of security commensurate with the postulated threat.

c. Obtain the maximum return possible from invested resources.

d. Serve as a basis for an asset-specific threat analysis.

2.2 Use Of Physical Security Vulnerability Risk Assessments

2.2.1. The background and explanation of step-by-step procedures for conducting a physical security vulnerability risk assessment for categories of NASA assets and determining minimum security requirements are contained in NPR 1620.2, Physical Security Vulnerability Risk Assessments.

2.2.2. A physical security vulnerability risk assessment shall initially be conducted for assets that NASA Center Directors, and/or Enterprise/IPO managers have determined are part of the NASA critical infrastructure established under Homeland Security Presidential Directive (HSPD) 7, "Critical Infrastructure Identification, Prioritization, and Protection" as outlined in Chapter 8, paragraph 8.4 and Appendix H, NPR 1600.1, NASA Security Program Procedural Requirements.

2.2.3. The physical security vulnerability risk assessment can also be used to assist Centers in meeting the intent of PDD 67, "Enduring Constitutional Government and Continuity of Government Operations" and PDD 62, "Countering Terrorism."

2.2.4. Subsequent physical security vulnerability risk assessments shall be conducted on all NASA asset categories in a timely manner in accordance with the following:

a. When an activity is activated.

b. When an organization permanently relocates to a new site or facility.

c. When no formal record exists of a prior risk assessment.

d. Every 3 years or more frequently at the discretion of the Center Director.

e. During the planning stages of new facilities, additions to facilities, and facility renovations.

f. When an incident occurs in which an asset is compromised.

2.2.5. The physical security vulnerability risk assessment shall be conducted jointly by the Center security office and designated representatives of the using organization.

2.3 Implementation of Physical Security Vulnerability Risk Assessments

2.3.1. Based on the physical security vulnerability risk assessment results, the organizational head, in coordination with the Center Chief of Security, shall implement security measures described in the chapters found in this NPR, as appropriate.

2.3.2. Implemented physical security and terrorism counteraction measures shall be recorded in writing. Copies of these records shall be maintained by the Center Chief of Security and the organization concerned.

CHAPTER 3: Physical Security Requirements for NASA Assets by Category

3.1 General

3.1.1. This chapter classifies common types of NASA property in readily understandable categories for quick reference.

3.1.2. Paragraphs 3.2. through 3.19 outline physical security and terrorism counteraction measures for specific categories of property by security risk level established using the risk assessment procedure in NPR 1620.2, Physical Security Vulnerability Risk Assessment.

a. Risk Level I physical security measures are considered as minimums.

b. Required physical security measures are designed to mitigate threats related to theft, potential compromise, damage, and sabotage of an asset resulting in temporary or permanent loss of the asset.

c. Additional terrorism counteraction measures are designed to mitigate terrorist threats related to the killing of people or the destruction of an asset.

3.1.3. For those assets where Risk Level I physical security measures have not been provided, the protection of the asset has only been considered at the higher level of risk based on its criticality to NASA's mission.

3.1.4. Chapter 4 of this NPR outlines physical security measures for other specified non-critical categories of property.

3.1.5. Although the asset categories of NASA property described in Chapter 4 does not necessarily require the conduct of a physical security vulnerability risk assessment, risk factors, property vulnerability, and appropriate protective measures shall be considered and employed where circumstances warrant.

3.1.6. Unless otherwise specified, perimeter fencing shall meet standard minimum requirements established in Chapter 6, section 6.6.

3.1.6.1. Modifications to interior physical security fences shall not be made solely to conform to the requirements of this NPR if the existing fence provides a comparable deterrent to penetration, and other compensatory measures, including electronic monitoring and sensing equipment are incorporated, where appropriate.

3.1.6.2. Installation perimeter fences not meeting the standard requirements established in Chapter 6, section 6.6, shall be properly prioritized for replacement by Center management based on the criticality of the asset, its level of vulnerability, and any reasonable and sustainable compensatory security measures that, when implemented, reduce the vulnerability to manageable levels.

Otherwise, the fence must be replaced at the earliest possible time, but not to exceed 24 months from time of determination.

3.1.7. For assets situated off NASA Centers, or in foreign countries, physical security measures outlined in Chapter 1, section 1.3 shall apply, at a minimum.

3.1.8. In those instances where physical security lighting is required, current national industry requirements, as established by the Illuminating Engineers Society of North America (IESNA), shall be consulted as a guide in deciding lighting patterns and minimum protective lighting intensities and requirements.

3.1.9. The CCS shall ensure requirements for electronic access control systems, intrusion detection systems (IDS), closed circuit television (CCTV), and other types of electronic physical security systems are coordinated with the Office of Security Management and Safeguards, to ensure appropriate systems integration and Agencywide system operations capability.

3.1.10. Conflicts between security and safety requirements must be identified and resolved in writing. Every effort shall be made to accomplish implementation of physical security requirements while ensuring safety issues are appropriately addressed. Waiver or exception requests must be processed jointly by the Center Security and Safety Offices in accordance with Chapter 1, paragraph 1.3, of NPR 1600.1, NASA Security Program Procedural Requirements.

3.2 Categories of NASA Physical Assets

3.2.1. A NASA asset may not always correspond exactly to the categories listed in paragraphs 3.3 through 3.17. If the identified asset does not fall within one of the categories listed in table 2-1, NPR 1620.2, Physical Security Vulnerability Risk Assessment, or if it falls within more than one category, select the category which most closely describes the asset, and note the difference in the asset description. If none is appropriate, the organization head, in conjunction with the CCS, shall develop and carry out those physical security measures deemed appropriate to safeguard the asset.

3.3 Aircraft and Components at NASA Aviation Facilities (Includes Remotely Piloted UAV and balloons)

3.3.1. Risk Level I.

a. When not in use, aircraft and aircraft components; to include crewmember equipment, at NASA aviation facilities, shall be placed in the most secure hangars or structures available on the Center.

b. When aircraft are not stored in storage structures, and when operational requirements permit, keep aircraft adequately separated from each other to limit potential for multiple aircraft incidents, but close enough for ease of monitoring, and away from the perimeter of the aircraft parking area.

c. Unless otherwise specified, aviation facility aircraft parking/ramp areas and runways shall be protected by a standard perimeter physical security fence as described in Chapter 6, Section 6.6.

d. Each NASA aviation facility shall develop, maintain, and update a written physical security plan. Aviation facilities located on other than NASA property shall coordinate the physical security plan with the appropriate host authorities. A copy of the physical security plan shall be provided to the CCS.

e. Each NASA aviation facility shall appoint a Facility Security Manager who shall work with the CCS to ensure security concerns are properly addressed and required measures implemented.

f. For aircraft parked at NASA aviation facilities where guards or roving patrols are available, aircraft shall be checked at least every 4 hours.

g. Access to aviation facility aircraft and aircraft components shall be controlled at all times. At a minimum, the airfield shall be designated and posted as a "Restricted" area.

h. Unescorted access to aviation facilities, aircraft, or ramp space/taxiways shall be authorized only after completion of an appropriate background investigation, attendance at a Center aviation safety briefing and subsequent issuance of an appropriate Airfied access photo-ID. [Note: No visible designator (letter, logo, etc.) will be placed on the face of the individual's official NASA photo-ID.]

i. Privately-owned vehicles shall be prohibited from the flight line or other areas where aircraft are parked, except when authorized in writing, by the aviation facility or airfield manager and CCS.

j. Aviation facility auxiliary power units for starting aircraft, vehicle tugs, forklifts, aircraft boarding ladders, and other items that might be used to circumvent existing physical security measures shall be secured during non-duty hours to prevent unauthorized use.

k. Unidentified luggage, parcels, etc. shall not be placed on aircraft until adequately screened or the owner is identified. All unclaimed luggage, etc., shall be turned over to security personnel for appropriate disposition.

l. Visitors (U.S. citizen and foreign nationals) shall be escorted at all times.

m. Foreign National contractor employees shall be properly cleared in accordance with NPD 1371.5 and NPR 1371.2. Escort requirements shall be in accordance with Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.3.2. Risk Level II.

a. All measures required for Risk Level I shall be implemented.

b. Aviation facility aircraft parking areas shall be protected by a standard perimeter physical security fence equipped with vehicle barrier cabling and other equipment (e.g., jersey barriers) capable of defeating or delaying incursions by bomb-laden vehicles.

c. Entry to and exit from all buildings associated with the aviation facility, aircraft parking areas, and support equipment storage areas shall be controlled at all times. Entry and exit can be controlled through manpower and procedural means, mechanical means, or electronic means.

3.3.3. Risk Level III.

a. All measures required for Risk Levels I and II shall be implemented.

b. Aviation facility aircraft parking areas shall be lighted at night sufficiently to allow physical security personnel to detect intruders. Airfield lighting shall be coordinated with the aviation facility manager for consideration of safety and training issues.

c. Where threat circumstances warrant, airfield perimeter physical security fencing shall be equipped with a perimeter intrusion detection system designed to alert a monitoring station to suspicious activity.

d. Where threat and/or mission circumstances warrant, IDS and CCTV shall be added to hangars where aircraft are stored.

e. Security Officers shall provide continuous roving surveillance of aircraft parked at NASA

aviation facilities. Aviation unit personnel working on or near aircraft may be considered to be equivalent to continuous surveillance provided appropriate emergency duress procedures are available to ensure timely notification and response by security officers. CCTV and IDS may be installed as an alternative to providing continuous surveillance for outside aircraft.

f. Aircraft and hangar areas shall be checked on a random basis by armed security personnel.

3.4 NASA Aircraft and Components Not at NASA Aviation Facilities

3.4.1. At a minimum, Physical Security Protective Measures for Risk Level I in subparagraph 3.3.1 above shall be implemented. In addition, the physical security procedures indicated below shall apply:

a. Aircraft shall be parked, whenever practical, at a Government airfield or civilian airport with an active physical security program. If a location has no security program and a crewmember cannot remain with the aircraft, the aircraft commander shall advise aviation facility and local law enforcement authorities, as appropriate, of the aircraft location, identification, length of stay, and ways to contact crewmembers.

b. The aircraft shall be checked at least once daily by a crewmember for any evidence of tampering, sabotage, placement of explosive devices, and loss or damage to aircraft or mission components.

c. When utilized for Ferry Flight operations, the Shuttle Carrier Aircraft shall be provided with physical security measures as identified in the KSC Security Handbook (KHB 1610.1) and DDMS FUNCPLAN 3610.

3.4.2. When appropriate, accessible and easily removable components shall be removed and stored in a location capable of being secured against theft, sabotage, or vandalism.

3.5 NASA Vehicles and/or Watercraft and Components

3.5.1. When not in use, vehicles shall be parked in motor pools to the maximum extent practicable. The motor pool shall be protected by a standard physical security perimeter fence or adequately monitored to preclude theft or vandalism. Watercraft shall be secured to docking facilities.

3.5.2. Risk Level I. Vehicles parked on the installation or watercraft docked at docking facilities shall be secured with a locking mechanism. These vehicles/watercraft shall be locked as follows:

a. Commercially-designed vehicles. Activate manufacturer installed door and ignition locking device(s).

b. Non-commercial-design vehicles/watercraft. Immobilize steering wheel with a chain and a U.S. Government approved padlock as specified in local policies. Activate installed door and ignition-locking devices. Hood, spare tires, and fuel tank shall also be secured with approved locking devices if the local environment warrants this action. High-security padlocks supplied with vehicles may be used to secure vehicles as long as other physical security measures required by applicable directives are followed.

c. Material handling equipment. Material handling equipment (MHE) and other NASA vehicles that cannot be secured as indicated in (a) and (b) above shall have the steering mechanism immobilized or transmission lever locked in the neutral position. Alternatively, these vehicles may be stored in secure structures.

d. Signs. "Off Limits To Unauthorized Personnel" signs shall be posted at the activity entrances.

e. Where guards or roving patrols are available, motor pools and docking areas shall be checked for tampering, sabotage, loss, and damage not less than once every 4 hours.

f. Privately-owned vehicles shall not be permitted in motor pools except those of organizations and personnel engaged in deployments. These persons may store privately-owned vehicles in the motor pool at the discretion of the Center Director or his/her designee, provided physical security measures are taken to safeguard NASA vehicles and components remaining in the motor pool.

3.5.3. Risk Level II.

a. All measures required for Risk Level I shall be implemented.

b. Vehicle parking areas, except those for empty trailers, and watercraft docking facilities, shall be lighted during the hours of darkness.

c. Vehicles shall be parked at least 20 feet from the perimeter of the parking area or as far from the perimeter as possible.

d. Entry to and exit from motor pools and docking facilities shall be controlled. Control of entry and exit may be by guards or locks on gates. Organization personnel working within the motor pool or on the dock may be considered an alternative to guards.

e. Types of vehicles particularly vulnerable to theft, misappropriation, or damage in the motor pool, shall be segregated. These vehicles shall be placed where organizational personnel can see them during operating hours and where roving guards can see them during non-operating hours.

f. Guards shall conduct physical security checks on the motor pool and/or docking facility on an irregular basis, but not less than once every 2 hours.

3.5.4. Risk Level III.

a. All measures required for Risk Levels I and II shall be implemented.

b. Ground anchors shall be constructed for trailers, semi-trailers, and other towed equipment or a cable shall be run through all items of such equipment and a lock shall be affixed to one end.

c. Vehicles particularly vulnerable to theft, misappropriation, or damage shall be placed in secured garages and motor sheds to the maximum extent practicable.

d. The motor pool/docking facility shall be designated a "restricted" area.

e. Personnel must have written authorization from organization heads or designee, before vehicles/watercraft are dispatched.

f. Operators shall be checked for possession of a valid operator's permit by motor pool or dock personnel, or guards before they use the vehicle or watercraft.

g. Continuous surveillance shall be made of the motor pool/docking facility by armed guards.

h. CCTV and other detection equipment may be installed as an alternative to providing continuous surveillance by armed guards.

3.5.5. Exceptions. Exceptions to this policy are as follows:

a. Vehicles/watercraft actively employed in field operations, or pending turn-in through property

disposal channels.

b. Dispatched emergency, security police, courtesy patrol, and interior guard vehicles/watercraft for brief periods when response time is critical for the successful performance of operator or crew duties. Ignition keys shall be removed from unaccompanied vehicles.

c. Trailers, semi-trailers, towed trailer systems, and other non-self-propelled vehicles.

d. Inoperable, unserviceable vehicles/watercraft. Procedures shall be implemented to protect these vehicles/watercraft from cannibalization, vandalism, etc.

e. Vehicles/watercraft without installed locking mechanisms, under the continuous surveillance of a guard or located in a secure location.

f. NASA vehicles outside the United States when so designated by the project manager.

g. Fuel tanker vehicles when, in the judgment of management personnel or the CCS, locking would create a potential unacceptable hazard to life or property. In this case, compensatory security measures, established jointly by the CCS and management, shall be taken.

h. Accessible and easily removable components. These components, vulnerable to theft because of value or utility, shall be removed and secured separately. Additional physical security for components shall be provided by one of the following methods:

(1). Storing in a securable storage structure.

(2). Storing in a locked, totally enclosed truck or van.

(3). Storing in a locked equipment box or similar container secured to an open bed vehicle; for example, in a locked toolbox chained to the bed of a truck.

(4). Securing the item directly to the vehicle by a locally fabricated method.

i. Master-keyed locksets. Use of master-keyed locksets to secure NASA vehicles or motor pools are prohibited except under the following conditions:

(1). When the lockset is used within one vehicle to secure the vehicle and its' various storage compartments. Master-keyed locksets shall not be used to secure more than one vehicle.

(2). When the lock-set is used to secure the manifold access doors and hatches of petroleum, oil and lubricants (POL) trucks (one set per truck) and, if they have hardened steel shackles, for the storage compartments of wreckers, heavy equipment, etc. (one set per vehicle). The same set shall not be used on more than one vehicle. Master-keyed locks shall not be used to secure vehicle steering wheels.

j. Keys and locks. Keys and locks shall be controlled according to Chapter 5, of this NPR.

k. Items used to defeat security measures. Items that can be used to defeat physical security measures, such as bolt cutters, hacksaws, oxyacetylene torches, axes, or steel rods or bars, shall be secured in respective tool kits or other secure locations when not in use.

3.6 NASA Vehicles, Watercraft, or Aircraft with On-Board Classified or Sensitive Equipment

3.6.1. NASA vehicles or aircraft with CONFIDENTIAL or SECRET components or equipment mounted either internally or externally on the vehicle or aircraft; located on NASA installations or

facilities, shall be secured with Risk Level II physical protective and physical security procedural measures established in paragraph 3.3, above.

3.6.2. When located at other than NASA owned and operated facilities, NASA vehicles or aircraft with CONFIDENTIAL or SECRET components or equipment mounted internally or externally shall be secured with at least the minimum physical security measures. These vehicles and aircraft shall be guarded at all times by an appropriately cleared and armed crewmember or dedicated armed guard.

3.6.3. NASA vehicles or aircraft with TOP SECRET components onboard shall be under constant surveillance by appropriately cleared and armed personnel regardless of location.

3.6.4. Equipment or components shall not be removed from vehicles or aircraft solely to fulfill a secure storage requirement. Frequent removal may cause increased equipment maintenance and may degrade operational readiness. However, classified equipment or components that can be readily dismounted without probable damage shall be dismounted and placed in secure storage, meeting local requirements established by the CCS.

3.6.5. In environments or unusual circumstances not clearly defined as requiring specific physical security measures under this NPR, the Center Chief of Security (CCS) shall establish appropriate physical security measures to protect the classified equipment or components.

3.6.6. Non-cleared personnel, cleared personnel with no "need to know," and foreign nationals, shall not be given access to classified or sensitive information or equipment without proper coordination with the appropriate Center Security personnel.

3.7 Petroleum, Oils, Lubricants (POL) at Bulk Storage Facilities

3.7.1. Risk Level I.

a. When not under the surveillance of personnel authorized to dispense the products, POL pumps shall be locked and electrical power shall be turned off. The electrical power shutoff shall be secured. Hoses to pumps shall be secured to prevent loss of POL through gravity feed. These measures are not required if pumps are activated by a credit card or key prompt type device.

b. Packaged POL shall be stored in structures capable of being secured against unauthorized entry. Large POL packages (for example, 55-gallon drums) shall be stored to preclude their use as hiding places for pilfered items.

c. Written instructions to POL-dispensing personnel shall include procedures for determining if patrons entering the facility are authorized.

d. When unattended, the facility shall be checked at least once every 4 hours.

e. POL credit cards, identification plates, and aviation fuel plates shall be centrally controlled.

f. Privately-owned vehicles shall not be permitted in POL storage facilities.

g. All issues of fuel shall be accounted for and supervised by authorized personnel.

h. Hoses or other devices to siphon fuel shall be secured. All containers that can be used to carry fuel also shall be secured.

i. Containers storing used POL shall be marked and stored separately.

j. Keys to POL storage areas, equipment, and buildings shall be controlled per Chapter 5 of this NPR.

3.7.2. Risk Level II.

a. Measures required for Risk Level I shall be implemented.

b. Storage facilities shall be bound by a standard perimeter physical security fence.

c. Gates and openings shall be closed and locked when not used.

d. "Off Limits to Unauthorized Personnel" signs shall be posted at the perimeter.

e. Facility attendants shall verify all POL quantities issued by personally reading the meter.

f. When unattended, the facility shall be checked at least once every 2 hours.

3.7.3. Risk Level III.

a. Measures established for Risk Levels I and II shall be implemented.

b. Storage facilities shall be lighted during the hours of darkness.

c. Seals shall be placed on all points of fuel storage that may allow extraction of fuel by any means. A broken seal may indicate tampering.

d. The storage facility shall be designated a "Restricted area."

e. Continuous surveillance shall be made of the facility by guards.

f. Intrusion detection systems and/or CCTV may be installed as an alternative to continuous surveillance by guards.

3.7.4. POL not at bulk storage facilities.

Risk Level I Physical Security Protective Measures and security procedures in subparagraph 3.7.1 above, shall be implemented. In addition, the following security procedures shall be implemented:

3.7.4.1. POL tank trucks that contain fuel and that are not under the surveillance of the operator or a dedicated guard force shall have:

a. Locked hatch covers where possible.

b. Locked manifold access doors.

c. Each manifold valve shall be secured with a transportation seal if a manifold access door cannot be locked.

d. Approved padlocks as specified (e.g., non-sparking brass locks for safety), if available.

e. Fuel pods on vehicles and fuel vehicle tanks shall be secured with approved padlocks when the vehicles or tanks are carrying fuel and are not under the surveillance of the operator.

f. Fuel-carrying vehicles shall be parked in lighted areas of airfields or in motor pools protected by locked perimeter barriers or guards, whenever possible.

g. Dome covers and manifold system shutoff valves of tanker rail cars with POL products aboard shall be locked when they are located on an installation for unloading and when POL handling personnel do not have the equipment under surveillance. Rail cars with packaged POL products aboard shall be secured by locking all doors.

h. Packaged POL not onboard a vehicle or rail car shall be safeguarded in such a manner as to preclude theft or tampering. To increase the security posture above minimum the area may be

protected by security lighting, perimeter fence, guards, or IDS. The need for implementing these additional measures shall be determined by local threat and vulnerability assessments.

3.8 Spacecraft Launch and/or Mission Control Facilities

3.8.1. Risk Level I.

There are no Risk Level I physical security protective measures for this type of asset.

3.8.2. Risk Levels II and III.

a. The facility shall be designated a "Limited Area" as a minimum designation.

b. A photo-ID system shall be used to identify authorized personnel.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, NASA Construction of Facilities Procedural Requirements, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements when other less costly compensatory measures could be implemented.

d. Access to the facility shall be controlled at all times via armed guards or the installation of a centrally managed access control system. An IDS/CCTV system shall be installed/integrated to ensure personnel accountability during all hours of activity, and to allow for real-time assessment of suspicious events.

e. The exterior of the facility shall be appropriately lit during the hours of darkness to allow security patrols the opportunity to detect unauthorized personnel and enhance CCTV operations.

f. Fence perimeter intrusion detection shall be utilized for all Risk Level III assets and for those Risk Level II assets that are not housed within a typical structure (i.e., electrical sub-stations or outside storage area for the asset). The perimeter IDS shall be placed so as to give the earliest indication of an intruder.

g. The facility shall be surrounded by a perimeter fence at a distance from the facility of at least 50 feet.

h. Clear zones of 30 feet on the inside and outside of perimeter fences shall be maintained.

i. Risk Level III assets shall be provided perimeter CCTV. The CCTV may be equipped with motion detection capability and utilized as a perimeter intrusion detection system as required by paragraph (d) above. Otherwise, the CCTV shall be integrated with the perimeter intrusion detection capability to provide immediate visual assessment of all alarm events.

j. IDS shall be deployed on all perimeter doors. First floor windows shall have glass breakage sensors, and all windows shall be locked regardless of floor.

k. All visitors (U.S. citizen and foreign national) shall be escorted, if facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), as established in Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

l. If facility is not part of the NASA MEIPP, escort of visitors shall be according to Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

m. Foreign National contractor employees shall be properly screened and managed in accordance with NPD 1371.5, Coordination and Authorization of Access by Foreign Nationals and U.S. Citizen Representatives of Foreign Entities to NASA, NPR 1371.2, Procedural Requirements for Processing

Requests for Access to NASA Installations or Facilities by Foreign Nationals or U.S. Citizens Who are Reps of Foreign Entities, and Chapter 4, paragraph 4.14, NPR 1600.1, prior to accessing the facility.

3.9 Communication Facilities and Associated Equipment (Includes Tracking Stations)

3.9.1. Risk Level I.

There are no Risk Level I physical security protective measures for this type of asset.

3.9.2. Risk Level II and III.

a. The facility shall be designated a "Restricted Area."

b. A photo-ID system shall be used to identify authorized personnel.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements, when other compensatory physical security measures could be implemented.

d. Access to the facility shall be controlled at all times via the installation of a centrally managed and monitored access control system. An IDS/CCTV system shall be installed/integrated to ensure personnel accountability during all hours of activity and to allow for real-time assessment of suspicious events. Vehicle entry points shall be controlled at all times by armed guards trained and capable of responding to and appropriately managing all types of security incidents.

e. A standard perimeter physical security fence shall be installed around the facility and operational areas to ensure unauthorized personnel are kept away from the facility and operations areas.

f. The exterior of the facility shall be appropriately lit during the hours of darkness to allow security patrols the opportunity to detect attempts to breach the protected area.

g. Vehicle barriers (e.g. bollards, jersey barriers, etc.) shall be employed, as appropriate, to ensure the facility is adequately protected against approaches by bomb-laden vehicles.

h. All visitors (U.S. citizens and foreign nationals) shall be escorted, if the facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), established per Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

i. If the facility is not part of the NASA MEIPP, escort of visitors (U.S. citizens and foreign nationals) shall be according to local policy.

j. Foreign national contractor employees shall be properly managed in accordance with NPD 1371.5 and NPR 1371.2 prior to accessing the facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.10 Super - Computing Facilities and Data Centers

3.10.1. Risk Level I.

There are no Risk Level I physical and procedural security protective measures for this type of asset.

3.10.2. Risk Level II and III.

a. The facility shall be designated a "Restricted Area" as a minimum designation.

b. A photo-ID system shall be used to identify authorized personnel.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements when other compensatory measures can be implemented.

d. Access to the facility shall be controlled at all times via a centrally managed access control system. An integrated IDS and CCTV system shall be installed to ensure personnel accountability during all hours of activity, and to allow for real-time assessment of suspicious events.

e. The exterior of the facility shall be appropriately lit during the hours of darkness to allow security patrols the opportunity to detect unauthorized personnel and to enhance CCTV capability.

f. Vehicle barriers (e.g. bollards, jersey barriers, etc.) shall be employed, as appropriate, to ensure the facility is adequately protected against approaches by bomb-laden vehicles.

g. All visitors (U.S. citizens and foreign nationals) shall be escorted if facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), as established in Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

h. If facility is not part of the NASA MEIPP, escort of visitors (U.S citizen and foreign national) shall be according to local policy.

i. Appropriate fire-suppression systems, protected air systems, emergency power on/off controls, dedicated back-up power, emergency gas and water shut-off valves should be installed, as deemed necessary, based on local threat conditions.

j. Foreign national contractor employees shall be properly screened in accordance with NPD 1371.5 and NPR 1371.2 prior to accessing the facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.11 Facility Engineering Supply and Construction Material Storage Areas

3.11.1. Risk Level I.

a. Buildings storing supply and portable construction material shall be securable against unauthorized entry.

b. Outside storage areas shall be enclosed by a perimeter fence.

c. "Off-Limits to Unauthorized Personnel" signs shall be posted at facility entrances.

d. Access to the facility and to keys, padlocks, and protective seals protecting access shall be controlled in accordance with Appendix I, NPR 1600.1, NASA Security Program Procedural Requirements.

e. Supplies shall be issued only to authorized personnel.

f. Incoming shipments of supplies shall be checked for improvised explosives devices (IED's).

g. Work orders shall be reviewed to determine if the recipient has requested excessive supplies for

the job to be done.

h. Entry of privately-owned vehicles into the storage building or outside storage areas shall be prohibited.

i. Entry of unchecked packages into the storage area shall be prohibited.

3.11.2. Risk Level II.

a. Measures required for Risk Level I shall be implemented.

b. Portable and easily pilferable items shall be separated from other supplies and construction material and stored in a separate room, building, or container with controlled access.

c. Outside storage areas shall be lit during the hours of darkness.

d. Small and easily pilferable supplies, construction material, and other items showing unexplained inventory loss shall be inventoried once each month. A copy of the inventory shall be kept until the next inventory.

e. Bulk packaged items securely crated, banded, or sealed shall remain in their original configuration and not broken until they are issued.

3.11.1.3. Risk Level III.

a. Measures required for Risk Levels I and II shall be implemented.

b. Buildings storing supplies and portable construction material shall be lit during the hours of darkness.

c. An IDS shall be installed in the storage building, if it is fully enclosed.

d. Landscaping features greater than 1 foot in height and other features that may obstruct views around the facility and provide concealment for aggressors shall be eliminated within 20 feet of the facility.

e. Access to storage areas shall be limited to facility personnel authorized to issue stock.

f. The storage building and outside storage areas shall be checked at least every 2 hours by a roving guard during hours that the facility is not operational.

3.12 Rocket Engine, Wind Tunnels, Simulators, and Other High-Speed Testing Facilities and Equipment

3.12.1. Risk Level I.

There are no Risk Level I physical and procedural security protective measures for this type of asset.

3.12.2. Risk Level II and III.

a. The facility shall be designated a "Restricted Area," as a minimum designation.

b. A photo-ID system shall be used to identify authorized personnel.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements when other compensatory measures could be

implemented.

d. Outside testing facilities shall be surrounded by a physical security fence meeting the minimum requirements stated below:

(1). Unless otherwise specified, interior perimeter fencing shall meet standard minimum requirements as established in Chapter 6 of this NPR.

(2). Modifications to existing interior perimeter fences shall not be made solely to conform to the requirements of this regulation if the existing fencing provides a similar deterrent to penetration, and other compensatory measures, including electronic monitoring and sensing equipment are incorporated, where appropriate.

e. Access to the facility shall be controlled at all times via armed guards or the through installation of access control systems. An IDS/CCTV system shall be installed/integrated to ensure accountability during all hours of activity and to allow for real-time assessment of suspicious events.

f. The exterior of the facility shall be appropriately lit during the hours of darkness to allow security patrols the opportunity to detect unauthorized personnel, and to enhance CCTV capability.

g. All visitors (U.S. citizens and foreign nationals) shall be escorted if facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), as established in Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

h. If the facility is not part of the NASA MEIPP escort of U.S. citizen and foreign national visitors shall be according to local policy.

i. Foreign national contractor employees shall be properly screened in accordance with NPD 1371.5 and NPR 1371.2 prior to accessing facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.13 Research and Associated Facilities

3.13.1. Risk Level I.

a. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements, when other compensatory measures could be implemented.

b. Facilities shall be locked during non-duty hours to preclude unauthorized entry.

c. The exterior of the facility shall be appropriately lit during the hours of darkness, to allow security patrols the opportunity to detect unauthorized personnel.

3.13.1.2. Risk Level II and III.

a. All measures for Risk Levels I shall be implemented.

b. The facility shall be designated a "Restricted Area," as a minimum designation.

c. A photo-ID system shall be used to identify authorized personnel.

d. Access to the facility shall be further controlled at all times via the installation of access control systems. An IDS/CCTV system shall be installed/integrated to ensure accountability during all hours of activity and to allow for real-time assessment of suspicious events.

e. All visitors (U.S. citizens and foreign nationals) shall be escorted if facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), in accordance with Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

f. If facility is not part of the NASA MEIPP, escort of U.S. citizen visitors only shall be according to local policy.

g. Foreign national contractor employees shall be properly cleared in accordance with NPD 1371.5 and NPR 1371.2, prior to accessing the facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.14 Animal Research Facilities and Associated Laboratories

3.14.1. Risk Level I.

There are no Risk Level I physical security protective measures for this type asset.

3.14.1.2. Risk Levels II and III.

a. The facility shall be designated a "Restricted Area," as a minimum designation.

b. A photo-ID system shall be used to identify authorized personnel.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements, when other compensatory measures could be implemented.

d. Access to the facility shall be controlled at all times through the installation of a centrally managed access control system. An IDS/CCTV system shall be installed/integrated to ensure accountability during all hours of activity and to allow for real-time assessment of suspicious events.

e. The exterior of the facility shall be appropriately lit during the hours of darkness to allow security patrols the opportunity to detect unauthorized personnel and to enhance CCTV capability.

f. All visitors (U.S. citizens and foreign nationals) shall be escorted, if facility is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), as established in Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

g. If facility is not part of the NASA MEIPP, escort of U.S. citizen visitors only shall be according to local policy.

h. Foreign national contractor employees shall be properly cleared in accordance with NPD 1371.5 and NPR 1371.2, prior to accessing the facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.15 Spacecraft (Shuttle, ISS, Etc.) and Associated Equipment

3.15.1. Risk Level I.

There are no Risk Level I physical security protective measures for this type of asset.

3.15.2. Risk Level II and III.

a. Asset shall be isolated from the general public.

b. The asset shall be designated a "Restricted Area," as a minimum designation.

c. Facilities housing these assets shall meet the physical security and anti-terrorism construction considerations identified in NPR 8820.2, to the maximum extent possible. Existing facilities shall not be retrofit to meet these requirements, when appropriate alternative compensatory security measures could be implemented.

d. While on a launch pad, the asset shall be protected by a perimeter physical security fence capable of preventing access. The area shall be well lit.

e Access to the facility and spacecraft shall be controlled at all times by armed personnel or the installation of a centrally managed access control system.

f. An IDS/CCTV system shall be installed/integrated to ensure accountability during all hours of activity, and to allow for real-time assessment of suspicious events.

g. While in transit to and from maintenance facilities and launch pads, the spacecraft shall be escorted by armed guards at a minimum.

h. All visitors (U.S. citizens and foreign nationals) shall be escorted, if facility or asset is included as part of the NASA Mission Essential Infrastructure Protection Program (MEIPP), as established in Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

f. If facility or asset is not part of the NASA MEIPP, escort of U.S. citizens and foreign national visitors shall be according to local policy.

g. Foreign national contractor employees shall be properly cleared in accordance with NPD 1371.5 and NPR 1371.2 prior to accessing facility. Escort requirements are per Chapter 4, paragraph 4.14, NPR 1600.1, NASA Security Program Procedural Requirements.

3.15.3. Terrorism counteraction measures specifically for NASA Spacecraft

Launch Operations.

3.15.3.1. NASA Spacecraft, most notably the Shuttle Transport System (STS) and future spacecraft, are NASA's most recognizable physical assets and as such are a potential target of terrorist intent on attacking the prestige of the United States . Launch preparations shall, at a minimum, include the following:

a. Long and short-term analysis of intelligence information for indications of specific threats directed against the Launch Vehicle.

b. Development and implementation of written security operation plans for each launch.

c. Continuous evaluation of status of key personnel (astronauts, families, launch/mission control personnel, etc.), to ensure appropriate levels of protection are in place and effective.

3.15.3.2. On-site and in-transit protection and accountability for Shuttle program components (e.g., solid rocket boosters, external tanks, etc.) shall be coordinated with the appropriate contractor organization, to ensure the level of protection afforded is commensurate with the threat and vulnerability determination.

3.16 Industrial and Utility Facilities and Equipment

3.16.1. Risk Level I.

a. Access into the area where the equipment is located shall be controlled to prevent unauthorized entry.

b. Keys to facilities and equipment shall be controlled per Chapter 5, NPR 1620.3, "Physical Security Requirements for NASA Facilities and Property."

c. The area shall be designated a "Restricted Area," as a minimum designation.

òá Risk Level II.

Measures for Risk Level I shall be applied and equipment shall be checked by roving patrols, at intervals not to exceed every 4 hours when the facility is unattended.

òá Risk Level III.

Measures for Risk Levels I and II shall be applied, except that checks by roving patrols, shall be every 2 hours when the facility is unattended.

3.16.4. Risk Level III.

a. If the equipment is not located within a structure, the area or vulnerable items of equipment shall be surrounded with an 8-foot-high reinforced concrete or masonry perimeter wall or surrounded by a physical security fence meeting the minimum requirements of Chapter 6, Section 6.6, of this NPR, and monitored by a centrally managed CCTV system.

b. If the equipment is located within a structure, the structure shall be equipped with a centrally monitored intrusion detection system (IDS).

3.17 Arms, Ammunition, and Explosives (AA&E)

3.17.1. At a minimum, AA&E, including pyrotechnics, shall be controlled/stored in accordance with the requirements in NPR 1600.1, NASA Security Program Procedural Requirements, Chapter 7, paragraphs 7.9.5 and 7.9.17, and 7.9.21 respectively. If deemed appropriate, Centers may adopt more stringent measures then those established in this NPR.

3.17.2. Organizations having access to and responsibility for AA&E, including pyrotechnics, shall establish strict accountability and inventory procedures. Procedures shall include:

(1) Issue and turn-in.

(2) Monthly inventory.

(3) Inspections.

(4) Proper storage and use of "shelf stock."

3.18 Mission-Critical and High-Risk Personnel

3.18.1. The NASA Assistant Administrator for Security Management and Safeguards, or his/her designee, in coordination with appropriate enterprise associate administrators, shall designate mission-critical and high-risk personnel.

òá Risk Level I.

Access to those areas of the facility where mission-critical and high-risk personnel are located shall

be controlled continuously when occupied.

òá Risk Level II.

a. Access to the entire facility shall be controlled continuously when occupied.

b. The exterior of the facility shall be appropriately lit during the hours of darkness, to allow security patrols the opportunity to detect unauthorized personnel.

3.18.4. Risk Level III.

a. Access to the entire facility shall be controlled at all times.

b. Access to the area surrounding the facility shall be controlled during times when the facility is occupied.

c. Specific threats shall be evaluated immediately by the Security Office and enhanced security provided, if determined appropriate.

d. Visitors to the facility who require entry into areas in which mission-critical or high-risk personnel are located shall be searched for weapons and explosives on at least a random basis.

e. Continuous surveillance of the area surrounding the facility shall be provided at all times, when the facility is occupied.

3.19 Administrative Support Facilities

3.19.1. Security procedural measures.

òá Risk Level I.

No such measures apply at this risk level.

3.19.1.2. Risk Level II and III.

a. Use of NASA photo-identification to facilitate entry of authorized personnel.

b. Use of a centrally managed electronic access control system and integrated video surveillance to facilitate access for authorized personnel and provide real time feed back on suspicious activity.

c. As appropriate to the situation, implement terrorism counter-measures identified in Section 3.20.

3.20 Terrorism Counteraction Measures

3.20.1. Terrorism counteraction measures.

3.20.1.1. Risk Level I.

a. Parking beneath facilities shall be eliminated where possible, and controlled where more practical to ensure only authorized personnel have access.

b. Parking exterior to the facility shall be kept as far away from the facility as possible, but at least 30 feet.

c. Trash receptacles, landscaping features, and other features greater than 1 foot in height that potentially provide concealment for aggressors or bombs shall be kept at least 50 feet from the facility.

d. Where feasible, locate mission-critical or high-risk personnel in the interior of the facility as far from the exterior as possible.

3.20.1.2. Risk Level II.

a. Windows into areas occupied by mission-critical or high-risk personnel shall be covered by a minimum 8-mil fragment retention film that shall be backed up by heavy drapes.

b. Windows and doors into areas occupied by mission-critical or high-risk personnel shall be locked such that any attempt to enter through them when the facility is unoccupied shall require forced entry, whose effects shall be noticeable.

c. Duress alarms shall be installed in areas occupied by mission-critical and high-risk personnel.

3.20.1.3. Risk Level III.

a. The facility shall be protected by a physical security fence meeting the minimum requirements of paragraph 3.1.6.2, at a distance from the facility of at least 50 feet.

b. Vehicle barriers (e.g., bollards, jersey barriers, etc.) shall be employed, as appropriate, to ensure the facility is adequately protected against approaches by bomb-laden vehicles.

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CHAPTER 4: Minimum Physical Security Requirements for Other Categories of NASA Property Not Necessarily Subject to Risk Assessment.

4.1 Miscellaneous Pilferable Assets (Includes Hand-Held Precision Tools, Lap-top Computers)

4.1.1. Tool sets and kits with lockable toolboxes.

These items, when not in use, shall be secured with a U.S. Government approved key-operated tumbler-type lock, consisting of either a padlock (including brass padlocks issued with the tool boxes) or a factory installed built-in key-operated tumbler type lock. The individual who signed for the set or kit shall retain the key. A duplicate key may be held by the supervisor, if it is stored in a locked container with controlled access.

4.1.2 Portable hand tools (e.g., electronic tools, tool sets or kits, and shop equipment).

Portable hand tools, tool sets or kits, and shop equipment. These items, when not in use and not under the surveillance of a responsible person (user, tool room keeper), shall be stored in a secure location. Non-portable items shall be secured in the building or van in which they are located. Doors and windows shall be closed and locked. Secure locations for portable items include:

4.1.2.1. A locked building or room or a locked metal equipment cage in a secured building.

4.1.2.2. A locked built-in cabinet, bin, or drawer in a secure room or bilding.

4.1.2.3. A locked drawer or compartment of a furniture item (wall locker, desk, etc.) in a secure room or building.

4.1.2.4. Attached to the building structure with a 5/16-inch chain or equivalent cable and a low security padlock or permanently fastened to a working surface.

4.1.2.5. Locally fabricated, lockable racks that, when locked, prevent toolbox lids from being opened or individually placed larger tools from being removed.

4.1.2.6. A locked enclosed truck, van, or vehicle trunk.

4.1.3. Common tools and portable shop equipment (includes power tools).

These items, when not on hand receipt to a user, shall be controlled through a locally devised receipt, sign-in/sign-out log, or exchangeable tag system. Tool checks (metal disks that can be

stamped or etched with an employee's identification) are available through supply channels under national stock number (NSN) 9905-00-473-6336.

4.1.4. Access.

Access to tools and shop equipment shall be controlled to the maximum extent practical. If possible, access shall be limited to the user, the individual designated as responsible for items when not in use, and supervisory personnel.

4.1.5. Keys and locks used to safeguard tools.

Keys, locks, and protective seals used to safeguard hand tools, tool sets or kits, shop equipment, and the facilities in which they are stored or located shall be managed per Chapter 5 of this NPR. Master-keyed or keyed-alike lock-sets shall not be used to secure these items.

4.1.6. Special accountability.

Precision hand-tools that are made for a specific purpose, and are usually expensive to replace, shall be placed under special accountability. Consideration shall be given to marking these items for identification and accountability.

4.2 Administrative and Housekeeping Supplies and Equipment

4.2.1. Minimum physical security requirements for furniture and office equipment.

Office buildings or rooms in which these items are located shall be secured when no responsible member permanently assigned to that particular activity is present.

4.2.2. Minimum physical security requirements for office machines.

4.2.2.1. Buildings, rooms, and offices in which office machines are located shall be secured, whenever an individual permanently assigned to the activity is not present. Security shall consist of closing and locking appropriate doors and windows, as a minimum.

4.2.2.2. Automated systems, including word processing systems, shall be secured to preclude theft.

4.2.2.3. When size and weight allow, small office machines such as hand-held calculators and portable lap-top computers shall be locked in a desk or cabinet.

4.2.3. Minimum physical security requirements for expendable and consumable supplies.

4.2.3.1. At the office levels, items not issued for actual use shall be centrally stored in secure cabinets, containers, rooms, or buildings. Keys, locks, protective seals, and access to storage facilities shall be controlled.

4.2.3.2. Pilferable items (e.g., pens, pencils, etc.) shall be stored in a central supply closet or securable metal cabinet, and issued when needed.

4.3 Precious Metals/Materials

4.3.1. Physical Security Protective Measures.

Precious metals/materials shall be stored in secure containers within a locked room or a secure storage area. Large quantities shall be provided with additional protective measures, such as IDS and CCTV.

4.3.2. Security procedural measures.

4.3.2.1. Users of precious metals/materials shall establish an accountability system, if not required under other regulations, to properly control the metal/materials. The system shall include:

(a) Inventory log.

(b) Inspection process.

(c) Issuance and turn-in process.

4.3.2.2. The Offices of Security, Logistics, and users of precious metals/materials shall jointly conduct inspections of stocks to ensure storage, protection, and usage procedures are properly followed.

4.4 Mailrooms

4.4.1. Minimum physical security requirements for mailrooms.

4.4.1.1. Facilities housing these assets shall meet physical security requirements necessary to preclude unauthorized access. Existing facilities shall be retrofit to meet these requirements or other compensatory measures (e.g., access control system, IDS, etc.) implemented.

4.4.1.2. Installation of metal caging inside of a structure shall be considered for separation and control of mailroom areas.

4.4.2. Physical Security Measures.

4.4.2.1. Access to the mailroom shall be controlled at all times. Installation of an access control system is an alternative to managing access via personal recognition by mailroom personnel.

4.4.2.2. Installation of an intrusion detection system (IDS) is recommended for after-hours protection.

4.4.2.3. The exterior of the facility shall be appropriately lit during the hours of darkness, to allow security patrols the opportunity to detect unauthorized personnel.

4.4.2.4. The facility or room shall be designated a "Restricted Area," as a minimum designation.

4.4.2.5. In coordination with the CCS, the mail handling activity shall develop a mail security plan, as required under 41 CFR Part 101-9, Part 102-192.85.

4.4.2.6. A photo-ID system shall be used to identify authorized personnel.

4.4.2.7. Visitors shall be escorted at all times.

4.4.2.8. Mailroom operations shall include the use of package screening devices for explosives and chemical/biological agent detection. Any mail identified as suspect shall be reported immediately to security personnel.

4.4.2.9. Centers shall consider establishing a "centralized" shipping and receiving activity to preclude direct customer receipt of threatening or dangerous mail/packages.

4.4.2.10. Self-contained air-handling equipment shall be installed to ensure contaminated air is properly mitigated. Procedures shall be in place for local evacuation of the mailroom facility, and if applicable, the shutdown of the air handling equipment for the mailroom.

4.4.2.11. Where appropriate, Center safety and security organizations shall collaborate on all facility and equipment design aspects of mailroom construction or modifications, to ensure designs meet safety and security operational expectations commensurate with existing threats.

4.5 Security of Medical Supplies and Equipment at Medical Facilities

4.5.1. Security Policy

4.5.1.1. Facilities, vaults, and containers used for storage of controlled medical substances or medically sensitive items shall not be used for storage of classified material.

4.5.1.2. A Serious Incident Report shall be submitted per Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements, for significant theft, loss, or recovery of Government-owned or possessed narcotics, dangerous drugs, controlled substances, precious metals, radioactive or other sensitive materials, including sensitive medical material or equipment, or mismanagement of stock records or recovery procedures for those items that prevent a determination of loss.

4.5.1.3. Schedule I drugs and substances shall be secured in the same manner prescribed controlled substances.

4.5.2. Personnel who are assigned duties that require access to controlled medical substances and sensitive items storage areas, including volunteers or those who have custodianship or possession of keys and combinations to locks securing such areas, shall be carefully selected and appropriately screened per Chapters 3 or 4, NPR 1600.1, NASA Security Program Procedural Requirements.

4.5.2.1. Criteria for selection of these personnel shall include moral character, prior employment history, maturity, and trustworthiness. Prior to assuming these duties:

a. Designated persons shall have satisfactorily undergone a local records check (LRC). Personnel exhibiting financial irresponsibility shall be excluded from consideration. Non-Government workers (e.g., volunteer workers) shall not be given unsupervised access to controlled medical substances and sensitive items. For new Government employees, results of the required investigation shall be known prior to granting them unescorted access.

b. An interview, by an appropriate Center security official, with the lowest level manager having managerial responsibility for the security of subject items is required. The purpose of the interview is to appraise the individual's character, judgment, reliability, attitude, emotional or mental maturity, and sense of responsibility. The interview shall be documented in writing.

4.5.2.2. The names and duty positions of personnel authorized unaccompanied access to controlled medical substances and medically sensitive items storage areas shall be depicted on a roster, which shall be posted inside the storage area.

4.5.2.3. Access to controlled substances denied to individuals undergoing investigation, treatment, rehabilitation, judicial, or administrative action as a result of actual or suspected drug use may be reinstated when--

a. Suspicions or allegations against the individual are determined to be unfounded.

b. Rehabilitation is successful.

4.5.3. Physical security during shipments of controlled medical substances and medically sensitive items shall be per appropriate NASA directives. In any event, in-transit security must be such that

the requirements of this NPR are not violated and that controlled medical substances and medically sensitive items are protected from unauthorized possession, use, and theft.

4.5.4. Disposal of controlled medical substances and items shall be per the provisions of the appropriate NPD and NPR.

4.5.5. Controlled medical substances or sensitive medical items shall be stored in secure storage locations or in locked containers.

4.5.5.1. Containers shall be locked at all times, except during restocking, inventory, or dispensing operations.

4.5.5.2. As a minimum, storage shall be in a location designated as a "Restricted Area," and protection provided shall be consistent with the type of item and perceived local threat of theft or diversion to unauthorized use.

4.5.6. At the close of business, designated personnel shall perform a security check prior to departure from rooms or facilities in which controlled medical substances and sensitive medical items are stored. These security checks shall be documented daily on Standard Form 701, Activity Security Checklist, as a minimum. This form shall ensure that:

4.5.6.1. No controlled items remain unprotected or exposed and that they are secured in designated containers.

4.5.6.2. Security containers are locked and checked properly with such action recorded on an SF 702 (Security Container Check Sheet).

4.5.6.3. All windows, doors, and other openings are secured to deter access to rooms in which containers are located.

4.5.6.4. Other vulnerable equipment or property is stored properly and secured.

4.5.6.5. When the medical facility is not occupied, security checks shall be conducted by security patrols at irregular intervals, not to exceed every 4 hours to avoid establishing a pattern. An intrusion detection system may be installed, to augment security patrol checks.

4.5.6.6. If used, the IDS shall consist of at least two types of intrusion sensors, a means of alarm annunciation at a central monitoring location, from which an armed response force can be dispatched, and electronically supervised circuitry between the two.

4.5.6.7. If the substances are entirely within a container, detection may include a capacitance sensor on the container itself.

4.5.6.8. If the substances are not entirely within a container, IDS sensors shall be installed such that they detect intruders before they breach any components of the vault, room, or building that are associated with providing delay to the intruders. The vault, room, or building shall provide a delay greater than or equal to the time required for the response force to respond to the alarm.

4.5.6.9. Installation of IDS equipment shall be per applicable local specifications. When local conditions dictate, a duress switch or holdup button may be added. Design reviews apply.

4.5.6.10. An SOP for the activation, deactivation, and daily testing of the IDS shall be published by the security office. The SOP shall include instructions for maintaining an accurate IDS log.

4.5.7. All instances of suspected theft, loss, illegal entry, open or unlocked facilities or containers, and other incidents of a suspicious origin shall be reported immediately to designated authorities. Surveillance shall be maintained, until responding personnel arrive at the scene.

4.5.8. Storage areas shall be provided with operational interior and exterior lighting, at all times during the hours of darkness.

4.5.9. Medical Facility security coordinators shall establish procedures for the protection of locks, keys, and combinations used to secure facilities, vaults, and containers in which controlled medical substances and sensitive items are stored.

4.5.10. The number of people with access to keys and combinations shall be the minimum necessary for efficient operations.

4.5.11. Provisions listed in Chapter 5 of this NPR shall be followed in establishing key control procedures.

4.5.12. Clinics and veterinary (animal care) facilities shall conform to the physical security requirements listed below.

4.5.12.1. When duty personnel are in attendance 24 hours a day, normal operating quantities of controlled medical substances and sensitive medical items shall be stored in double-locked containers. Containers must be constructed so that forced entry is readily apparent to visual examination.

4.5.12.2. When duty personnel are not present 24 hours a day, normal operating quantities of controlled medical substances and sensitive medical items shall be stored in a GSA-approved safe and an additional barrier shall be provided, such as locating safes inside a locked room.

a. Normal operating quantities of controlled medical substances and sensitive medical items shall be stored according to the criteria in paragraph 4.5.12.1. above.

b. If this is not possible, containers constructed of a minimum of 26-gauge steel with a single lock may be used, provided additional security measures are taken (for example, increased surveillance or improved lighting), and provided the steel container is secured inside a locked room.

4.5.13. All storage containers for controlled medical substances and sensitive medical items shall be located in areas designated as "restricted" per Chapter 7, NPR 1600.1, NASA Security Program Procedural Requirements.

4.5.15. Containers shall be secured after duty hours.

4.5.16. To prevent loss or theft during operating hours, containers shall be unlocked only when property is being inserted, removed, or when the container is under the observation of designated personnel.

4.5.17. Unit dose carts containing controlled substances shall be kept in restricted areas when not in use.

4.5.18. To prevent loss or theft during the administration of medications, unit dose carts shall be kept under the physical control or unobstructed observation of designated personnel.

4.5.19. Storage areas shall be provided with operational interior and exterior lighting, at all times during the hours of darkness.

4.5.20. The number of crash carts and emergency trays (essential emergency assemblages) that contain controlled substances shall be kept to a minimum, and shall be provided with maximum security consistent with requirements for immediate availability.

4.5.21. When controlled medical substances or items are issued to emergency medical team

personnel assigned to ambulance or emergency vehicle response duties, the controlled substances or items shall not be stored in the vehicle while it is unattended.

4.5.22. Controlled substances and items must remain under control or observation of responsible personnel at all times and, shall be stored in restricted areas when possible.

4.5.23. Locking devices on emergency assemblages hinder immediate availability to controlled medical substances and sensitive items by medical treatment personnel, and shall not be used.

4.5.24. Appropriate sealing devices may be used to indicate tampering and to assist in inventory, but they must be easily opened without the use of a key, combination, or other time-delaying device.

4.5.25. Emergency assemblages containing controlled medical substances shall be sufficiently protected, but must not hamper ready and authorized visual inspection and immediate removal for use.

4.5.26. Accountability and control requirements are per applicable organization policy.

4.5.27. Unused needles, syringes, and other medically sensitive items shall be stored in a locked container.

4.5.28. Used and unused needles and syringes shall not be stored in the same cabinet or container.

4.5.29. Pending final destruction, used needles and syringes may be temporarily stored in closed one-way puncture resistant receptacles ("Sharps" containers).

4.5.30. "Sharps" containers must be of a tamper-resistant design, and must be either:

4.5.30.1. Locked to a mounting device that is securely fastened to the building structure.

4.5.30.2. Located in a room or area that is locked or under continuous visual surveillance of ward or clinic personnel.

4.6 NASA Visitor Centers and Outdoor Exhibit Displays

4.6.1. NASA Visitor Centers traditionally house one-of-a-kind, irreplaceable items of historical significance. Such items are generally considered invaluable because they are irreplaceable and shall be considered sensitive property. They shall be reasonably protected.

4.6.1.2. The degree of protection necessary must be determined locally and in partnership between the NASA COTR, Visitor Center Manager, Center Chief of Security, and supporting facility engineers.

4.6.1.3. Visitor Center buildings and apertures providing access to the building shall be modified or constructed so as to delay a determined intruder long enough for a security force to respond.

4.6.2. Security measures shall be implemented for those facilities and assets protected under the National Preservation Act of 1966 to the extent permitted. Consistent with this Act, IDS coverage shall be included for all vulnerable windows and doors.

4.6.3. Personnel assigned or attached (including special duty personnel) to staff NASA Visitor Centers must meet the security reliability requirements established in Chapter 4, NPR 1600.1, NASA Security Program Procedural Requirements.

4.6.3.1. At a minimum, a favorable National Agency Check (NAC) and local records check (LRC) shall be required by the Center Security Office before personnel are assigned or attached (including

special duty personnel) to Visitor Center duties.

4.6.4. The Visitor Center director, or designee, shall be designated the key custodian, whenever feasible.

4.6.5. Exterior doors used for access to Visitor Centers shall be secured with U.S. Government-approved padlocks (grade II, hardened steel shackle and body), deadbolt or other locks equal to these devices, as determined by the servicing facility engineer, if installation does not detract from the aesthetic value of the facility. The number of exterior doors with exterior exposed padlocks shall be kept to the absolute minimum. All other exterior doors shall be secured on the inside.

4.6.6. Visitor center keys shall be maintained separately from high-value item storage IDS keys.

4.6.6.1. Keys shall not be left unattended or unsecured at any time.

4.6.6.2. The use of a master or multiple key system shall be in accordance with Chapter 5 of this NPR.

4.6.7. Where a NASA Visitor Center or exhibit is protected by an approved IDS, and the IDS is operational, museum personnel, as authorized by the Visitor Center manager, may remove the keys to the Visitor Center or exhibit from the installation at which the Visitor Center or exhibit is located. Unless authorized by the Center Chief of Security (CCS), where an approved IDS is not installed, the Visitor Center keys shall not be removed from the installation, but shall be locked in a secure strongbox in a secured location on post, such as the security dispatch office. Visitor Center personnel, as authorized by the Visitor Center Manager, may retain custody of the keys in this strongbox.

4.6.8. Duplicate keys shall not be kept with operational keys. They shall be maintained by the Visitor Center manager, Center locksmith, or placed in a secure location where they may be accessed by authorized personnel only.

4.6.9. Where combination locking devices are used to secure items such as containers and display cases, the combination shall be controlled and safeguarded to preclude unauthorized access.

4.6.10. Interior and exterior lighting shall be provided in all Visitor Center buildings in which sensitive property is located. Lighting around artifacts shall have proper UV filtering for artifact conservation. Sensitive property is property requiring a high degree of protection and control because of its vulnerability to theft or potential for use in an illegal activity, or for its historic value. As a minimum, all entrances shall be lit during hours of darkness.

4.6.11. Installation of IDS may supplement existing security measures or provide a commensurate degree of protection. Established Center requirements for IDS and access control systems shall apply.

4.6.12. The viewing surfaces of exhibit or display cases shall be constructed of at least 1/4 inch-thick plate glass, transparent acrylic plastic, or transparent poly-carbonate plastic, securely fastened into frames or into the container. UV acrylic shall be used as appropriate to facilitate artifact conservation.

4.6.12.1. Where plate surfaces join at an angle, the edges shall be bonded and rounded to prevent insertion of a pry tool. UV acrylic shall be used as appropriate to facilitate artifact conservation.

4.6.12.2. Cases with hinged openings must have all hinge butts concealed or spot welded, or use a comparable security measure.

4.6.12.3. Non-viewing surfaces of cases shall be constructed to offer a higher degree of protection than the viewing surface.

4.6.13. Workshops used by museum personnel for maintenance or restoration work shall be secured at the close of each business day.

4.6.14. Each Visitor Center shall be attended by at least one member of the Visitor Center staff, who is tasked with Visitor Center security while it is open to the public. This function can be combined with other duties.

4.6.14.1. Visitor Centers that are organized within several separate, non-connecting buildings shall have Visitor Center or security personnel in each facility, an electronic monitoring system, or security personnel shall conduct periodic checks of facilities and displays.

4.6.14.2. The Visitor Center attendant shall be especially alert to detect pilferage, damage, or theft.

4.6.15. To ensure adequate surveillance of all parts of the Visitor Center, the installation of one-way mirrors and electronic sensing devices shall be considered and installed, as appropriate.

4.6.16. NASA Center Chiefs of Security (CCS) shall ensure that all Visitor Centers are on an assigned security patrol route, and that special orders include an unscheduled check at least once every 4 hours by that patrol during non-duty hours on a daily basis.

4.6.17. Large items of historical property that are displayed outdoors in Visitor Center parks shall be anchored to prevent theft.

4.6.17.1. Pilferable component parts shall be secured to the display or removed at the close of each business day.

4.6.17.2. Visitor Center parks and exterior displays shall be provided electronic and/or video surveillance where warranted, and checked periodically by security patrols.

4.6.18. Loss of historical property shall be reported to the security officer for appropriate investigation.

4.7 NASA Child Care Facilities

4.7.1. To the extent practical child care facilities shall be situated and constructed to ensure maximum protection of children and staff. Child care facilities shall not be situated adjacent to Center fence perimeters or critical infrastructure assets. Center security personnel shall be consulted during design processes to ensure appropriate security measures are included.

4.7.2. Retrofitting existing facilities to meet minimum security considerations established by this NPR is essential to offsetting any security vulnerabilities caused by construction deficiencies.

4.7.3. To ensure appropriate access control and personal accountability, NASA Centers shall employ IT-based access control systems at all child care facilities:

4.7.3.1. Center Security Offices shall ensure the installation of an IT-based duress (panic) system throughout the child care facility.

4.7.3.2. All rooms and outside play areas shall have duress capability. Child care staff shall be trained and periodically tested in the use of the duress system.

4.7.3.3. Use of CCTV to assist in management of security at NASA child care facilities is mandatory for outside play areas, facility and fence perimeter, reception areas, and other areas presenting

security concerns.

4.7.4. Security fencing shall be installed around all exposed play areas.

4.7.5. All entrance gates shall be secured and made capable of being opened from the inside only.

4.7.6. A key or access control card shall be required to open gates from the outside.

4.7.7. Minimum fencing characteristics shall be in accordance with the specifications outlined in Chapter 6 of this NPR, and additional requirements established below.

4.7.7.1. Playground equipment shall not be installed within 15 feet of a perimeter security fence.

4.7.7.2. Installation of "Privacy Slats" to preclude unauthorized outside surveillance.

4.8 TV, VCR, DVD, Cameras, Bicycles, and other Sensitive Items

Center management shall ensure items of value, as defined in NPR 4200.1E, NASA Equipment Management Manual, are provided protection commensurate with local theft conditions and accountability practices.

CHAPTER 5: Keys, Locks, Locking Devices (Including Hasps and Chains), and Protective Seals

5.1 Key Issuance

a. Keys shall be signed out to authorized personnel, as needed, on a key issue form.

b. Only authorized Government personnel, branch head or higher, and their designees, may approve the issuance of keys to organizational personnel for facilities under their control.

c. Keys for contractor personnel shall also be issued in accordance with paragraph b. above.

d. Office keys shall be issued to occupants of that office only.

5.2 Master Keys

a. Building master keys shall be kept to the absolute minimum.

b. No more than the minimum number of building master keys shall be issued, and then only to key personnel in that facility.

c. Center master keys shall be issued only to security, fire, and when appropriate, other authorized personnel.

5.3 Key Depository

a. A lockable container, such as a safe, filing cabinet, or a key depository made of at least 26-gauge steel, equipped with a tumbler-type or touch-pad locking device and permanently affixed to a wall, shall be used to secure keys.

b. The key depository shall be located in a room where it is kept under 24-hour surveillance or in a room that is locked when unoccupied.

c. The locksmith shop key and records storage area shall be protected by an Intrusion Detection System (IDS).

5.4 Locks

a. The use of a master key system or a multiple key system shall be strictly managed by the installation locksmith. Management of NASA-owned buildings shall not procure coring and keying

services of outside companies.

b. U.S. Government key-operated, pin-locking deadbolts or deadbolts that project at least 1 inch into the door frame or tumbler-type padlocks shall be used to safeguard unclassified and nonsensitive NASA supplies and equipment, if a lock is required.

(1) Selection shall be based on the value of items protected, mission essentiality, and vulnerability to threats.

(2) All questions regarding approved locks and locking devices shall be addressed to the individual Center Security Office and locksmith.

c. Padlocks and keys not in use shall be secured in a locked container that does not contain or store classified material, or in a locked room. Access to the container or room shall be controlled.

5.5 Key And Lock Accountability

a. Keys and combinations to locks shall be accounted for at all times. Individually issued keys to offices shall not be duplicated nor loaned out.

b. High security padlocks and their keys shall be inventoried by serial number semiannually. A written record of the inventory shall be retained, until the next inventory is conducted.

c. When a key to a high security padlock is lost or missing, an inquiry shall be conducted and the padlock replaced or re-cored immediately, if the situation warrants replacement.

d. A key and lock inventory shall be maintained, which includes a list of all of the following:

(1) Keys.

(2) Locks.

(3) Key serial numbers.

(4) Lock serial numbers.

(5) Location of locks.

(6) The number of keys maintained for each lock. This list shall be maintained and secured in the locksmith shop.

e. In coordination with the locksmith, facility service managers (FSM) shall conduct yearly inventories of keys for their facility and provide a copy of the inventory results to the locksmith. Discrepancies shall be rectified with the locksmith.

f. Rekeying and recoring of individual facilities shall be conducted when:

(1) Control and accountability of keys has been compromised.

(2) Requests for replacement of lost keys is equal to or greater than 25% of total issued keys for that facility or door in the facility. The organization responsible for the facility shall fund the rekey/recore activity.

(3) The facility is vacated and issued keys have not been recovered. The new occupant shall fund the rekey and recore activity.

g. High-security padlocks and keys that do not have a serial number shall be assigned one. This

number shall be inscribed on the lock or key as appropriate.

5.6 Additional Key and Lock Controls for Key Containers

a. Keys to key containers shall not be removed from the installation except to provide for protected storage elsewhere.

(1) Keys to locks securing key containers shall be afforded physical protection equivalent to that provided by the key container itself.

(2) Keys to containers shall be maintained separately from other keys, and shall be accessible only to those individuals whose official duties require access to them.

b. At no time shall keys be in the custody of a person not authorized to have them.

c. Under no circumstances shall keys and locks or alternate keys or locks be placed in any security container that contains or stores classified material.

(1) When arms and ammunition are stored in the same areas, keys to those storage areas shall be maintained together, but separately from other keys that do not pertain to AA&E storage.

(2) The number of keys shall be held to the minimum essential. Keys shall not be left unattended or unsecured at any time.

(3) Keys required for maintenance and repair of IDS, including keys to the control unit door and monitor cabinet, shall be kept separate from other IDS keys.

(4) Access shall be permitted only to authorized maintenance personnel.

(5) IDS keys shall be stored in containers of at least 20-gauge steel equipped with GSA-approved low security padlocks or GSA-approved built-in three-position changeable combination locks, or in GSA-approved Class 5 or Class 6 containers that do not contain or store classified material. Combinations shall be recorded on SF 700 (Security Container Information), sealed in the envelope provided, and stored in a separate container.

(6) Security containers weighing less than 500 pounds shall be fastened to the structure with bolts or chains equipped with secondary padlocks to preclude easy removal.

d. In the event of lost, misplaced, or stolen keys, an administrative investigation shall be conducted immediately.

(1) The affected locks or cores to locks shall be replaced when practicable.

(2) Replacement or reserve locks, cores, and keys shall be secured to preclude access by unauthorized individuals.

e. Combination to locks on vault doors or GSA-approved Class 5 or Class 6 security containers shall be changed upon change of custodian, or other person having knowledge of the combination, or when the combination has been subject to possible compromise.

(1) Combinations shall also be changed when a container is first put into service.

(2) The combination shall be recorded using SF 700, sealed in the envelope provided, and stored in a container meeting local storage requirements.

(3) No other written record of the combination shall be kept.

(4) Controls shall be established to ensure that the envelopes containing combinations to locks are not made available to unauthorized personnel.

f. Replacement of lock cylinders and broken keys for high-security locks shall be coordinated with the local security office locksmith.

5.7 Additional Key and Lock Requirements

Aircraft and vehicle storage facilities in which vehicles or aircraft are permanently based with sensitive items onboard shall be outfitted, as appropriate, with security doors and frames (i.e., steel frames, metal-clad solid core doors), and secured with approved secondary high-security hasps and padlocks. Existing hangar doors are considered sufficient if properly employed at the end of each workday.

5.8 Chains

When a chain is required for security of unclassified but sensitive equipment and supplies, specifications for approved chains shall be obtained from the local security office.

5.9 Use and Control of Protective Seals

a. Purpose of the seal. The purpose of the seal is to show whether the integrity of a storage facility, vehicle, rail shipment, or container has been compromised.

b. A plain seal is not a lock, although combination items referred to as "seal-locks" are available.

c. The purpose of a seal, no matter how well constructed, is defeated if strict accountability and disciplined application are not maintained.

d. Ordering and storing seals. Seal construction specification shall include--

(1) Durability. Seals must be strong enough to prevent accidental breakage during normal use.

(2) Design. Seals must be sufficiently complex to make unauthorized manufacture of a replacement seal difficult.

(3) Tamperproof. Seals must readily provide visible evidence of tampering and be constructed in a way that makes simulated locking difficult once the seal has been broken.

(4) Individually identifiable. Seals must have embossed serial numbers and owner identification.

(5) Ordering and issuing. A single office on an installation shall be responsible for ordering and issuing seals. The source for the seals shall be instructed to ship the seals to the attention of a seal custodian in that office.

(6) Unused seals. Seals not issued for actual use shall always be secured in a locked, metal container with controlled access. Only seal custodians and alternates shall have access. Recorded monthly inventories shall be conducted to preclude undetected loss of seals.

e. Accounting for seals. Seal custodians shall maintain an IT-based seal logbook.

(1) The issuance process of seals to a using office, unit, or activity custodian shall reflect date of issue, name of recipient, and seal serial numbers.

(2) The issuance process of a seal for actual use by a custodian shall reflect the seal number, date and time applied, identification of items to which applied (and location on item if other than main door(s)), and the name of the person applying the seal. For outbound loaded trailers, railcars, and container shipments, the appropriate trailer, railcar, or container number and load destination shall be noted.

f. Application of seals.

(1) Seal all doors and openings, not merely the main one.

(2) Run seal straps through hasp only once. Seals wrapped around several times become illegible.

(3) Listen for "click" when inserting point of seal into sheath.

(4) To ensure positive closure, tug down on strap, and twist the point section inserted into the locking mechanism.

g. Checking seals. Centers using seals shall develop procedures for checking them. These procedures shall include actions to be taken to break a seal, and actions to be taken upon finding a broken seal.

5.10 Disposition of Used Seals

a. All shipping documents shall reflect seal number(s). All seals shall be verified with seal log, shipping documents, or other appropriate documents before removal and disposal.

b. Seals must be defaced sufficiently upon removal, so that they cannot be used to simulate a good seal. They shall be disposed of in normal trash.

c. If the user seal log is located on the same installation, the custodian shall be advised of the destruction of the seal, or the seal shall be returned to the custodian.

d. The custodian shall annotate the date and time removed, and the name of the individual removing the seal across from the original entry on the seal log.

5.11 Changing Seals

If used, the colors of seals shall be changed periodically, as an additional physical security measure.

CHAPTER 6: Protective Barriers

6.1 Purpose

6.1.1. To establish minimum criteria for physical security barriers and openings at NASA Centers.

6.1.2. Additionally, facilities and operations, when established under the provisions of the NASA mission essential infrastructure protection program (MEIPP), must meet specific criteria established in Chapter 6 of this NPR.

6.1.3. Physical barrier requirements are designed to deny, impede, or discourage access to NASA areas by unauthorized personnel or groups. This is accomplished by one or more of the following:

6.1.3.1. Defining the perimeter of the installation and any security areas.

6.1.3.2. Creating a physical and psychological deterrent to entry, as well as making a legal statement that entry is not permitted.

6.1.3.3. Delaying intrusion into security areas, thus making more likely the detection and apprehension of intruders by protective forces.

6.1.3.4. Facilitating the effective and economical utilization of protective forces.

6.1.3.5. Directing the flow of personnel and vehicles through designated portals, in a manner that permits efficient operation of a personnel identification and control system.

6.2 Types of Barriers

6.2.1. Protective barriers are divided into two major categories: natural and structural.

6.2.1.1. Structural barriers are manmade devices such as fences, walls, floors, roofs, grilles, bars, roadblocks, or other structures that deter penetration.

6.2.1.2. Natural barriers may be forests, rivers, swamps, beaches, or other terrain difficult to traverse.

6.3 General Considerations

6.3.1. Established physical security barriers at NASA Centers are not designed to stop a determined intruder, but rather to deter or delay.

6.3.2. Such barriers, depending on area security, should be augmented by security personnel and IT-based surveillance and monitoring systems, when warranted.

6.3.3. When planning or establishing security barriers at NASA Centers, the CCS shall consider the following, prior to recommending security barriers:

6.3.3.1. Physical barriers that are as personnel-proof as economically feasible should be established around all security areas. The type of barrier used should be determined after a study of local conditions has been made by the CCS and facilities engineering professionals with security engineering backgrounds.

6.3.3.2. In some instances, the temporary nature of the security interest makes the construction of costly permanent physical barriers impracticable and unjustifiable. In such cases, the security interest must be protected by other means, such as use of temporary barriers, additional protective forces, patrols, and other compensating protective measures.

6.3.3.3. In cases of extreme criticality and vulnerability of NASA facilities, it may be necessary to establish two lines of physical barriers at the security area to be protected.

6.3.3.4. The immediate boundaries of a NASA Center and any specific designated security area shall be fenced. As a minimum, "U.S. Government-No Trespassing" signs with appropriate prosecution warnings shall be attached not more than 100 feet apart along, and at each corner of, the boundaries of the land. This defines the perimeter, provides a buffer zone, facilitates control, and makes accidental intrusion unlikely.

6.3.3.5. In establishing any perimeter barrier at a NASA Center, due consideration must be given to providing emergency entrances and exits in case of fire.

6.3.3.6. The size of an individual internal security area shall depend on the degree of sensitivity required and the complexity of the area. As a rule, size should be kept to a minimum consistent with operational efficiency. Positive barriers at NASA Centers shall be established for:

a. Controlling vehicular and pedestrian traffic flow.

b. Checking identification of personnel entering or departing.

c. Conducting random vehicle checks.

d. Defining a buffer zone for more highly classified or sensitive areas.

6.3.4. Individual Center geographical and environmental characteristics, specifically water and marshland boundaries, present special security problems. Such areas at any Center should be defined by appropriate fencing and signs.

6.3.5. Construction of new security barriers and removal of existing barriers and related work must be approved by Center Security, and scheduled to provide a continuous level of security for the activity/program.

6.4 Temporary Barriers

6.4.1. In some instances, the temporary nature or infrequent existence of a sensitive program/project requiring security constraints does not justify the construction of more permanent physical perimeter barriers.

6.4.2. In such cases, a Center-designated limited area or closed area of temporary nature and short duration may be established, in which the reduction of security resulting from deficiencies in physical barriers is compensated for by additional security forces, patrols, and other security measures, during the period of restriction.

6.4.3. Barricade requirements include jersey barriers, blast resistant concrete wall construction, and

security fencing.

6.4.4. In any case, a designated temporary security area shall not exceed 30 days from date of installment without specific authorization from the CCS.

6.4.5. The use of wire barriers or similar construction for temporary enclosures is recommended as being both expeditious and effective, with a minimum use of security forces required to control and safeguard the area.

6.5 Security Fences

6.5.1. Security fences at NASA Centers should enclose all designated security areas, and shall be constructed in such a manner that they are reasonably impassable.

6.5.2. The nature of the security area shall determine the degree of restriction of movement of personnel, vehicles, and equipment necessary for adequate security.

6.5.3. The Center CCS must approve all security fence requirements and, prior to approval, shall assess the permanency of the security area, availability of materials, presence of natural aids to security, Center security personnel, security vulnerabilities, and the degree of security required.

6.6 Security Fence Standards

6.6.1. Chain-link fencing shall be the type of structural barrier most commonly used and recommended for security purposes at NASA Centers, and should enclose all designated security areas.

6.6.2. The following fence standards shall apply.

6.6.2.1. Fabric. The standard fence fabric shall be at least 9-gauge zinc- or aluminum-coated steel-wire-chain link with mesh openings not larger than 2 inches per side and a twisted and barbed selvage at top and bottom.

6.6.2.2. Fabric ties. Only 9-gauge-steel ties with coating compatible with the fabric shall be used. In lieu of wire ties on fence posts, approved fabric clamps can be used. In lieu of wire ties on bottom and top taut wires, hog clamps may be used. Spacing between ties should not exceed 12 inches.

6.6.2.3. Height. The preferred height of any NASA security fence is 9 feet. This includes, at a minimum, a fabric height of 8 feet, plus a 1-foot barbed-wire top-guard. Concertina (Razor) wire may be used in lieu of the barbed-wire top-guard to provide added protection against intrusion for areas of high sensitivity. Building connections shall be higher. Fencing 12 feet high from the connection point of the building to the distance of 12 feet from the building is recommended, unless the building wall itself is less in height.

6.6.2.4. Fencing posts, supports, and hardware. All posts, supports, and hardware for security fencing shall meet the requirements of Federal Specification RR-F-191K/GEN of May 14, 1992, unless superceded by later issuance. All fastening and hinge hardware shall be secured in place by peening or spot welding to allow proper operation of components, but prevent disassembly of fencing or removal of gates. All posts and structural supports shall be located on the inner side of the fencing. Posts shall be positively secured into the soil to prevent shifting, sagging, or collapse. Fence posts should be placed no more than 10 feet apart and mounted in concrete 36 inches deep. The diameter of the concrete shall not be less than 10 inches for line posts, and not less than 12 inches for corner and gate posts.

6.6.2.5. Reinforcement. Taut reinforcing wires (at least 9 gauge) shall be woven through, or affixed with, the fabric along the top and bottom of the fence for stabilization of the fence fabric. Top and center rails should not be used, as they may provide added assistance for climbing.

6.6.2.6. Ground clearance. The bottom of the fence fabric must be within 2 inches of firm soil, or buried sufficiently (concrete footings or gravel may be used) in soft soil to compensate for shifting soil.

6.6.2.7. Culverts and openings. Culverts under or through a fence shall be of 10-inch pipe or of clusters of such pipe or its equivalent. Openings under or through a fence shall be secured with material equal or greater in strength than the overall barrier.

6.6.2.8. Fence placement. No fence should be located so that the features of the land (its topography) or structures (buildings, utility tunnels, light and telephone poles, fire escapes, ladders, etc.) defeat its purpose by allowing passage over, around, or under the fence.

6.6.2.9. Topguards. Topguards are constructed on perimeter fences and may be added on interior enclosures for additional protection. A topguard is an overhang of barbed wire along the top of a fence, facing upward and outward, at approximately a 45-degree angle. Topguard supporting arms shall be permanently affixed to the top of fence posts to increase the overall height of the fence by at least 1 foot. Three strands of 12-gauge barbed wire, spaced no more than 6 inches apart, must be installed on the supporting arms. The topguard of fencing adjoining gates may range from a vertical height of 18 inches to the normal 45-degree outward protection, but only for sufficient distance along the fence to open the gates adequately.

6.7 Barriers

6.7.1. Buildings, structures, waterfronts, and other barriers used instead of (or as a part of) a fence line should provide equivalent protection to the fencing required for that area.

6.7.2. All windows, doors, and other openings must be provided adequate protection (e.g., wire mesh caging), or properly secured.

6.7.3. Walls

6.7.3.1. Where walls, floors, or roofs serve as barriers, they should be constructed and arranged to provide uniform protection equivalent to that provided by chain-link fencing as specified.

6.7.3.2. In this connection, windows and other openings in perimeters of security areas in any of the following categories should be protected by securely fastened bars, grills, or other equivalent structural means.

a. Openings less than 18 feet above uncontrolled ground, roofs, ledges, etc.

b. Openings less than 14 feet directly or diagonally opposite uncontrolled windows in other walls, fire escapes, roofs, etc.

c. Openings less than 6 feet from uncontrolled openings in the same wall.

6.7.4. Perimeter Openings

6.7.4.1. Openings in perimeter barriers shall be kept to the minimum necessary for the safe and efficient operation of the Center.

6.7.4.2. The CCS, in coordination with facilities engineering, safety and fire, shall approve all

openings.

6.7.4.3. Authorized barriers shall be constantly locked, controlled by authorized personnel, or otherwise secured to prevent unauthorized entry or exit.

6.7.4.4. Those areas that cannot be secured because of safety/fire hazards may be secured utilizing lead seals.

6.7.4.5. When locked and not under constant surveillance, they shall be subject to periodic checks by protective forces or other designated personnel and/or monitored by security surveillance cameras.

6.7.5. Gates.

6.7.5.1. Gates are designed to facilitate the entrance and exit of authorized personnel and vehicle traffic, and to control its flow.

6.7.5.2. The CCS, in coordination with facilities engineering, safety and fire, shall establish gate operations and designations.

a. Designated gates shall be limited to the number consistent with efficient operations and traffic flow.

b. Alternative gates, which are closed except during peak movement hours, may be provided, so that heavy traffic flow can be expedited.

c. When open or operating, all gates shall be under continuous positive control.

d. Gates shall provide protection equivalent to the outer fences or barriers of which they are a part when not in use. These gates shall be locked to form an integral part of the established perimeter when secured.

6.7.6. Pedestrian gates.

a. Approved pedestrian gates and turnstiles shall be channeled in such a manner that allows only one person entering or departing to approach the custodial sentry at a time.

b. Some channels may be closed between peak use hours.

c. Where possible, pedestrian and vehicular gates should be clearly separated.

d. All vehicle gates shall be equipped with a center stabilizing rod and hole.

6.7.7. Vehicle Gates.

6.7.7.1. Where feasible, approved vehicle gates should be set well back from any public highway, so that temporary delays caused by identification control checks at the gate shall not cause traffic hazards extending out onto a public highway.

6.7.7.2. There should also be sufficient space at the gate to allow for spot checks, inspections, searches, and temporary parking of vehicles, without impeding the flow of traffic.

6.7.8. Inspection

6.7.8.1. When gates are not in active use, they shall be locked and frequently inspected by security personnel.

6.7.8.2. Locks shall be serviced as required. The CCS shall assure security and accountability for the keys to locks on these gates per Chapter 5 of this NPR.

6.8 Doors, Windows, and Skylights

6.8.1. Building or egress doors at NASA Centers or at the secure area perimeter should provide the protection (e.g., metal doors, secure hinges, fastened pins, or inside heavy-duty hasps and staple set) commensurate with the requirement for proper protection of the assets accessible through those doors.

6.8.2. Windows, skylights, and other openings that penetrate the perimeter barrier and have a security mesh or grating area of 96 square inches or greater should be protected in such a manner as to preclude physically breaching the opening.

6.8.3. Use of protective screens is recommended when the threat level is such that the screens could provide the additional value of preventing missiles, such as hand grenades, bombs, and incendiaries, from being hurled through the windows from outside the perimeter.

6.9 Sewers, Culverts, and Other Utility Openings

6.9.1. Sewers, air intakes, exhaust tunnels, and other utility openings that penetrate the perimeter or security area barrier and have a cross-section area of 96 square inches or greater shall be protected by securely fastened bars, grilles, locked manhole covers, or other equivalent means that provide security commensurate to that of the perimeter or security area barrier.

6.9.1.1. As a reminder, these bars and grilles across culverts, sewers, storm sewers, etc. are a hazard when susceptible to clogging, and should be considered during planned construction of such bars and grilles.

6.9.1.2. All such areas should be designed to permit rapid clearing or removal of grating when conditions require such action.

6.9.1.3. Removable grates shall normally be locked in place.

6.10 Utility Poles and Trees

Poles and trees located outside or inside of and within 10 feet of the perimeter barrier of the security area present a possible means of illegal entry. To reduce this possibility, the perimeter barrier may be adjusted so as to increase the distance to more than 10 feet and heightened to the extent necessary to prevent entry, or the obstruction must be removed. If these utility poles, signboards, trees, etc. also obstruct the visibility of the security officer, they must be moved (or removed) at least 10 feet outside or inside the perimeter barrier.

6.11 Clear Zones

6.11.1. Designated security areas and protective barriers at NASA Centers shall maintain unobstructed areas or clear zones.

6.11.2. The unobstructed areas or clear zones should be maintained on both sides of and between physical barriers.

6.11.3. This shall be accomplished by removal of all trees, brush, rock piles, etc. within the designated zone and the frequent cutting of vegetation or the use of chemicals designed to control or

kill such vegetation.

6.11.3.1. Vegetation shall not exceed 8 inches in height.

6.11.4. These areas shall be kept free of vehicles, structures, and debris.

6.11.5. Protective barriers inside a clear zone should be at least 10 feet from the perimeter.

6.11.6. Where possible and when the sensitivity of the activity requires a larger clear zone, it should be provided to preclude/minimize damage from thrown objects such as incendiaries or bombs.

6.11.7. Protective barriers outside clear zones shall be 10 feet or more from the perimeter fence/protective barrier and any exterior structures, vegetation, or any obstruction to visibility.

6.11.8. Construction of any new protective barrier for security operations having a smaller clear zone must be coordinated with facilities engineering, safety and fire, and approved by the CCS.

6.11.9. Although 10 feet is the permissible minimum criteria for NASA Centers, every effort shall be made to establish a clear zone external to the protective barrier of 75 feet.

6.11.10. The minimum NASA standard clear zone for effective surveillance of the perimeter terrain when planning new activities or expansion of existing activities is 10 feet inside the barrier, 10 feet between barriers/fences, and 10 feet exterior to the boundary fence.

6.11.11. In addition to security, these clear zones also provide the safety feature of a 60-foot-wide fire-break between a Center's operational areas, structures, or storage facilities and the adjoining areas. It is especially important to maintain clear zones during periods of high fire risk.

6.12 Inspection and Repair of Barriers

6.12.1. Center security or other designated personnel shall periodically check designated barriers for defects that would facilitate unauthorized entry. Both Center security and other personnel must be alert to detect the following:

6.12.1.1. Damaged areas (cuts in fabric, broken barbed wire/ posts).

6.12.1.2. Deterioration (corrosion).

6.12.1.3. Erosion of soil beneath the barrier.

6.12.1.4. Loose-fitting barbed wire, outriggers, or fabric fastener.

6.12.1.5. Growth in the clear zones that would afford cover for possible intruders.

6.12.1.6. Obstructions at or on the fence that would afford concealment or aid entry/exit for an intruder.

6.12.1.7. Evidence of illegal or improper entry.

6.12.1.8. Damaged or tampered lead seals in place.

6.13 Signs and Posting of Boundaries

6.13.1. The boundaries of NASA Centers shall be posted with signs having the wording "RESTRICTED AREA - NO TRESPASSING" (NASA Form 1506) in 2-inch red/black letters. (See Appendix G for other signs.)

6.13.2. Signs shall be located on the exterior side of the Center perimeter barrier or mounted on posts along the boundary line.

6.13.3. The interval between signs shall be adequate to permit at least one sign visible and legible during daylight hours to anyone approaching the boundary from outside the Center.

6.13.4. All designated security areas or spaces shall be plainly identified by signs reading "RESTRICTED AREA," "LIMITED AREA," or "CLOSED AREA."

6.13.4.1. These signs shall further bear in small lettering the words, "Unauthorized Persons Who Enter May Be Subject to Prosecution Under 18 U.S.C. 799."

6.13.4.2. Signs shall be placed on the outward edge of the clear zone or security areas and on the perimeter fence.

6.13.4.3. The purpose of this placement is to prevent unintentional approach to the security area barrier through the clear zone.

6.13.4.4. Signs shall be spaced such that they are visible and legible to anyone approaching the security area from any direction.

6.13.5. All roads approaching the security area shall be clearly posted with restrictive-entry signs.

6.13.6. The requirements contained herein are considered the minimum acceptable.

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 11

T30C Test Chambers

Test Chamber Specifications

Specifications
Tenney Temperature / Humidity Cycling Chambers

<<Go Back

Tenney Products

Temperature / Humidity Cycling Chambers

Benchtop / Junior Chambers

Altitude / Vacuum Chambers

Environmental Rooms

Specialty Chambers

Vibration Test Systems

Control Systems

Accessories

Quick Chamber Selector

Classic Tenney Series

10, 20, and 30 cubic foot models

Overall dimensions in inches(mm) for the 10, 20, and 30 cubic foot models:

Model	Non-humidified	T10S	T10C	T20S1.5	T20C-3	T20C-4	T30S	T30C
	Humidified	T10RS	T10RC	T20RS1.5	T20RC-3	T20RC-4	T30RS	T30RC
Workspace	W	24(610)		30(762)			36(914)	
	D	27(686)		32(813)			40(1016)	
	H	28(711)		36(914)			36(914)	
Exterior	W	30(762)		41(1041)			46(1168)	
	D	47(1194)		55(1397)			64(1625)	
	H	74(1880)		84(2134)			84(2134)	

Temperature & Humidity								
Low	C	-40	-73	-40	-73	-73	-40	-73
High	C	+200	+200	+200	+200	+200	+200	+200

Change Rates in Minutes								
Time starting at Ambient to listed temperature. Based on empty chamber.	**200°**	30	30	60	60	60	70	70
	150°	20	20	40	40	40	50	50
	93°	15	15	25	25	25	25	25
	65°	10	10	15	15	15	15	15
	0°	10	5	40	10	5	40	10
	-18°	20	10	60	15	10	60	15
	-40°	60	20	90	30	20	90	25
	-54°	—	25	—	40	25	—	35
	-65°	—	35	—	50	35	—	50

Live Load Capacity in Watts (Humidity System Off)								
Temperature °C	**+10°**	600	1275	600	1200	1800	600	1600

	-18°	450	1000	450	1000	1500	500	1400
	-40°	100	850	100	850	1275	250	1200
	-54°	—	600	—	700	1050	—	1000
	-65°	—	400	—	500	750	—	700

Utilities, etc								
Refrigeration		(1)1.5HP	(2)1.5HP	(1) 1.5HP	(2) 1.5HP	(2) 2HP	(1) 2HP	(2) 2HP
Heater Capacity		2.5 KW		2.5 KW (3 KW If 208 Option)				
Humidifier	KW	1 KW		2 KW				
	GPH	.5		1.0				
AMPS @ 230V. 1		28	30	32	34	35	34	35
AMPS Fuse		35	40		45			
Unit Weight	LBS.	850	950	1250	1350	1400	1500	1500

Humidity capability: 20% to 98% RH in the dry bulb range of +20C or +85C as limited by a 3 dew point. Test data based on 24C ambient, sea level, 60 Hz. On 50 Hz or higher than 24C, ambient performance may be reduced. Consult factory regarding any special cooling requirements.

40 and 64 cubic foot models

Overall dimensions in inches (mm) for the 40 and 64 cubic foot models:

Model	Non-humidified	T40S-2	T40C-4	T40C-6	T64S-7.5	T64C-6	T64C-15
	Humidified	T40RS-2	T40RC-4	T40RC-6	T64RS-7.5	T64RC-6	T64RC-15
Workspace	W	40(1016)			48(1219)		
	D	44(1118)			48(1219)		
	H	40(1016)			48(1219)		
Exterior	W	66(1676)			72(1829)		
	D	73.5(1867)			81.5(2070)		
	H	80.25(2038)			91(2311)		

Temperature & Humidity							
Low	C°	-40	-73	-73	-40	-73	-73
High	C°	+200	+200	+200	+200	+200	+200

Change Rates in Minutes							
Time starting at Ambient to listed temperature. Based on empty chamber.	**200°**	35			45		
	150°	25			30		
	93°	10			15		
	65°	5			10		
	0°	5			5		
	-18°	20	—	—	10	10	—

	-40°	120	—	—	25	30	—
	-54°	—	45	40	—	45	20
	-65°	—	60	50	—	65	35

Live Load Capacity in Watts (Humidity System Off)							
Temperature °C	+10°						
	-18°	1000	—	—	4500	—	—
	-40°	100	—	—	1000	—	—
	-54°	—	1200	2000	—	1200	4000
	-65°	—	900	1500	—	800	2500

Utilities, etc													
Refrigeration		(1) 2 HP		(2) 2 HP		(2) 3 HP		(1) 7.5 HP		(2) 3 HP		(2) 7.5 HP	
Heater Capacity		6		6		6		8		8		8	
Humidifier	KW	2		2		2		2		2		2	
	GPH	1.0		1.0		1.0		1.0		1.0		1.0	
AMPS		230V. 1		230V. 1		230V. 1		230V. 1		230V. 1		230V. 1	
S & C	RC & RS	41	50	50	50	38	46	71	80	57	65	71	80
Fuse		50	60	60	60	60	70	100	110	70	80	100	110
Unit Weight	LBS.	2740						3540					

Standard Features at a Glance:

S = Standard on all models
H = Units with humidity
T = Temperature only units

Proprietary VersaTenn control system	H
Tenney *VaporFlo*® humidity system	H
Vapor tight interior made of 100% stainless steel	S
Non-settling, asbestos-free insulation	S
Control tolerance of ±0.3°C and ±2% RH typical after stabilization	S
Platinum RTD temperature sensor	S
Humidity sensor which requires no wet wick or water supply	S
Semihermetic refrigeration system	S
Low mass nichrome, open wire heating system	S
NEC wiring compliance	S
Vertical-down recirculating conditioning system	S
Double silicon gaskets on doors	S
Automatic defrost for door gaskets	S
3" Phenolic casters	S
Watlow F4 controller	T

Options:

10, 20, 30 ft^3

40 & 64 ft^3

A = Available Option

IEEE interface	A	A
LinkTenn software for Windows®95 that permits your computer to control up to 10 chambers	A	A
RS422, 423, 232 or 485 interface assemblies	A	A
6-event relay board @ 1 amp each	A	A
Water demineralizer	A	A
Water reservoir for humidity system (5 gallon)	A	A
Recirculating system for humidity water	A	A
Viewing window, thermally insulated and heated	A	A
Interior lighting	A	A
Shelving, adjustable and removable	A	A
Water-cooled refrigeration system	A	A
Alternate power supply wiring	A	A
Automatic CO2 or LN2 cooling boost system	A	A
Additional ports, gloves, etc.	A	A
Rubber tire casters: 5" or 6" (3" steel are standard)	A	A
Thermocouple or electrical feed through terminals	A	A
Special connectors	A	A
GN2 purge system	A	A
Refrigeration taps and pressure gauges	A	A
Remote console for instrumentation	A	A
Recording instruments	A	A
Redundant thermal protection and alarm system	A	A
External dryer for obtaining humidity as low as 5% (to 20°C)	A	A
Air cooled refrigeration system	A	A
Alternate refrigeration and/or heating systems for faster temperature change rates or increased product load handling capabilities.		A

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New Columbia, PA 17856-9396

TPSinfo@tps.spx.com

Site Access, Use and Privacy

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 12

Modular In-Plant Office

Catalog Data

PORTA-KING

PK-175 Series Modular Building System

The Low Cost, High Quality In-Plant Building System

The PK-175 Series is an extremely versatile system that offers you the quality and dependability you need, at a price you can afford.

Perfect for a wide range of plant and office applications, the PK-175 Series provides you with the many design options that allow you to quickly meet your changing building needs and space requirements.

The system is highly adaptable to special site conditions and can be moved or added on to as your needs change/grow. Plus, system panels can be customized to virtually any color, finish, style or material you want – we can even fabric cover for exceptional aesthetics and sound attenuation.

Sturdy, all-anodized aluminum construction provides years of superior service: 1) Extruded aluminum post/frame components won't rust like steel component systems when exposed to moisture in wash-down applications or in high humidity environments. 2) Heavy-duty aluminum support posts assure a strong, tight connection between wall panels.

For the modular building system that provides the best of both worlds – quality and low cost – the Porta-King 175 Series has no equal. Check out the system's many features.

System Benefits:

- Very economically priced
- Re-usable, pre-finished wall panels provide years and years of attractive, flexible service and allow for easy cleaning and upkeep for reduced maintenance costs.
- Thin panel design provides outstanding strength while maximizing existing floor space. Perfect for applications where efficient utilization of floor space is critical.
- A full selection of doors, hardware and glazing available.
- Excellent for partial and full-height partition systems.
- Standard panel finish of vinyl covered hardboard available in seven standard colors.
- Optional panel finishes include: vinyl covered drywall, fiberglass reinforced plastic, painted or stainless steel, embossed aluminum, Kydex, Melamine, HPL, PVC and acoustical carpet or fabric.
- Optional panel construction can accommodate UL Class 1 fire classification and/or non-combustible construction.





Perfect for:

In-Plant Offices
Workstations
Security Enclosures
Cafeterias
Break Rooms
Equipment Enclosures
Computer Rooms
Partitions
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Darkrooms
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Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 13

Blast & Paint Facility

Hoffman Blast II, Catalog Cut

Hoffman Blast II by Circle R Industries, Inc.

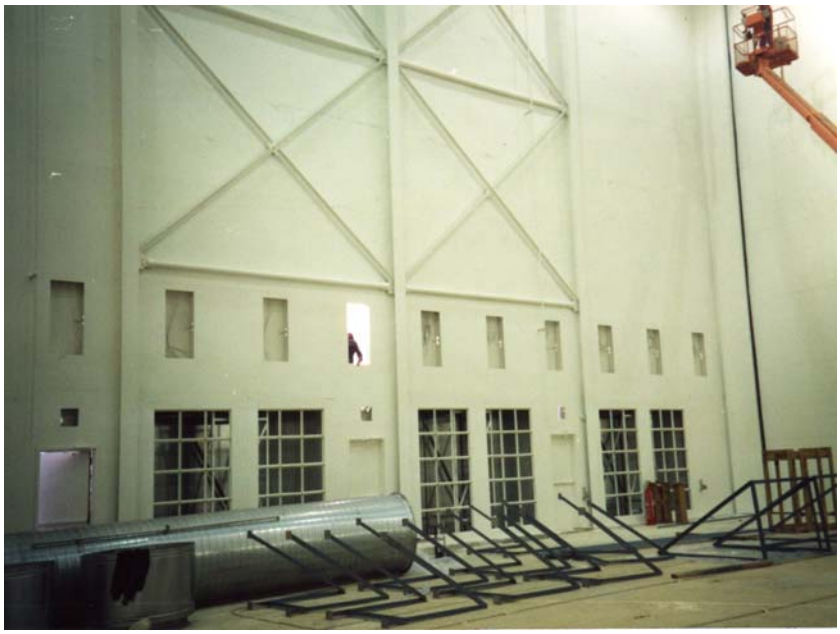
Project Houston, TX: Turbo-Fab is one of North America's largest blasting and painting facilities.



Foundation work prior to pouring concrete: following the land contour, this foundation sloped an actual twelve inches (12") from end to end prior to building structure being leveled accordingly.



Building structure with blast and paint skin on structural framework: required door pockets allow for the 50 foot work door openings at each end of both the blastroom and paint room as well as each end of the middle section, in which the clean and dirty air is segregated.



Customization of modified Down draft paint air system, utilizing pitless design.



View of completed project from paint exit end of facility: powered work doors are partially open, exhibiting air inlets and lighting.



View of completed projects flow-through facility: the nearest end is the blasting area, and the far end is the painting area.



Both the blasting and the painting areas were 80 feet long, 60 feet wide, and 50 feet high. The blasting area was custom-designed to have partial reclaim with two (2) sets of rail tracks running through both systems to connect the manufacturing building to the port's ship channel.

NOTE: These photos are an example of a Blast Paint Booth that is provided by Hoffman Blast. This is not submitted for bidding purposes but as an example that this building can be provided by a manufacturer as a complete fabricated building or as a modular unit. These photos are not to limit the contractor from providing the highest quality building for the most economical cost.

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 14

Photographs

Blast & Paint Facility Site

BLAST & PAINT FACILITY PHOTOGRAPHS



Drainage on East of site



Drainage on the North/East corner



Manhole on the North/East corner



North View of Site

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 15

Photographs

Building 3202

BUILDING B3202 PHOTOGRAPHS



East Elevation



East Elevation



East Elevation



East Elevation





North Elevation



North Elevation Entrance



North Elevation



North/West Elevation



North/West Elevation



Drainage along the North Elevation



West Elevation



Existing racks



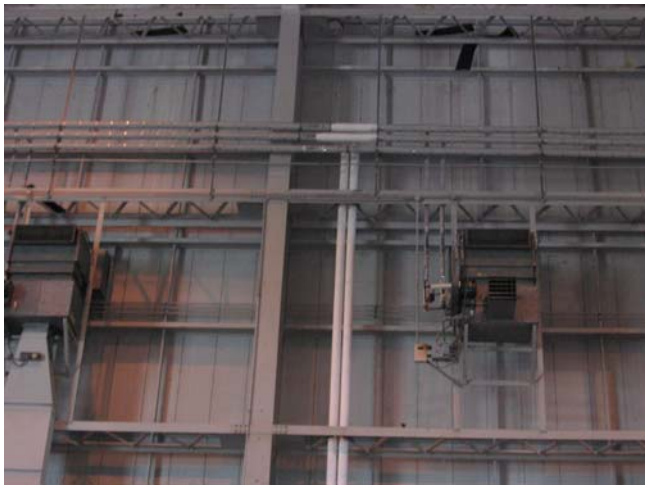
Existing racks



Inside North wall



Inside North wall



Inside North wall



Modular Office on North wall to remain



Inside North/East corner



Modular office on North wall to remain



Modular office on North wall to remain



North wall



East Wall

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 16

Photographs

Building 3205

BUILDING B3205 PHOTOGRAPHS



Drainage along the South of the building



West Elevation



West Elevation



West Elevation



West Elevation



North Elevation (Entry)



North Elevation



Covered Walkway between building B3205 and B3203



South/East Elevation



Covered Walkway



Test booth in the LRU test lab



Test booth and equipment in the LRU test lab



LRU test lab facing South/West



LRU test lab facing South/East



LRU test lab facing East



LRU test lab facing South/East





Storage in the LRU test lab



LRU property storage facing West





LRU property storage



LRU property storage facing South/West

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 17

Photographs

Building 3209 Site

BUILDING 3209 SITE PHOTOGRAPHS



Building 3209 site (facing North)



Building 3209 site (facing North/East)



Remove existing blast booth and CMU wall (facing north).
Leave existing metal building intact



Remove CMU wall (facing East)



Remove paint booth (facing East)



Remove CMU wall (Facing West)



Remove blast booth and CMU wall (facing North)



Remove blast booth



Remove cargo unit (facing South)



Remove storage building (facing South)



Remove CMU wall but leave storage building intact (facing South/East)



Remove CMU

Part 6 – Attachments

NDBC Renovation & Expansion

Stennis Space Center, MS

Tab 18

Miscellaneous Documents

Permits Record of Decision (PROD)

Performance Assessment Plan (PAP)

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
**Use referenced notes where additional space required.		
Air Quality	**PERMIT: Construction** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Air Quality	**PERMIT: Operating** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Air Quality	**PERMIT: Asbestos Demolition & Removal** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Air Quality	**PERMIT: Other** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:		WORK ORDER NUMBER:
	LOCATION:		
	GOVERNMENT PROJECT MANAGER:		
Water Pollution	**PERMIT: Wastewater Collection System**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Water Pollution	**PERMIT: Wastewater Pump Station**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency		
	Special Provisions and Requirements:		
Water Pollution	**PERMIT: Wastewater Treatment Plant**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Water Pollution	**PERMIT: Pretreatment, i.e. Oil/Water Separator**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Water Pollution	**PERMIT: Septic System** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Water Pollution	**PERMIT: Erosion & Sediment Control** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Water Pollution	**PERMIT: Stormwater Management** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Water Pollution	**PERMIT: Other** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)			
	PROJECT TITLE:		**WORK ORDER NUMBER:**
	LOCATION:		
	GOVERNMENT PROJECT MANAGER:		
Discharge Permit	**PERMIT: New or Increased Capacity NPDES**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Discharge Permit	**PERMIT: General NPDES (≥1 Acre Land Disturbance)**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Discharge Permit	**PERMIT: Other**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Drinking Water	**PERMIT: Water Distribution System**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:		WORK ORDER NUMBER:
	LOCATION:		
	GOVERNMENT PROJECT MANAGER:		
Drinking Water	**PERMIT: Water Treatment Plant**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Drinking Water	**PERMIT: Well Construction**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Drinking Water	**PERMIT: Underground Injection**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Drinking Water	**PERMIT: Other**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Fuel Tanks	**PERMIT: Underground Storage Tank Construction** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Fuel Tanks	**PERMIT: Underground Storage Tank Operating**	
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Fuel Tanks	**PERMIT: Other** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions, and Requirements:	
Solid and Hazardous Waste	**PERMIT: Hazardous Waste Treatment, Storage, Disposal, Handling** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)			
	PROJECT TITLE:		**WORK ORDER NUMBER:**
	LOCATION:		
	GOVERNMENT PROJECT MANAGER:		
Solid and Hazardous Waste	**PERMIT: Landfill**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Solid and Hazardous Waste	**PERMIT: Used Oil Collection Center, Aggregation Point, Transporter & Transfer Facility**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Solid and Hazardous Waste	**PERMIT: Other**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Coastal Management Permit	**PERMIT: Coastal Consistency Determination Authorization**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:		WORK ORDER NUMBER:
	LOCATION:		
	GOVERNMENT PROJECT MANAGER:		
Coastal Management Permit	**PERMIT: Coastal Barrier**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Coastal Management Permit	**PERMIT: Floodplain Management**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Coastal Management Permit	**PERMIT: Other**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		
Other Permits	**PERMIT: Work in Navigable Waters**	Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**		
	Issuing Agency:		
	Special Provisions and Requirements:**		

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Other Permits	**PERMIT: Dredging** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Clearing** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Essential Fish Habitat Assessment Consultation** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Marine Mammal Protection Act** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Other Permits	**PERMIT: Take Permits** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Work in Wetlands** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Digging Permit** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Traffic** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Other Permits	**PERMIT: Airport Hazard/Airfield Safety Clearances**	Date Obtained: / Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Railroad Crossing**	Date Obtained: / Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Historic Preservation**	Date Obtained: / Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Noise Abatement**	Date Obtained: / Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

PERMITS RECORD OF DECISION (PROD)

PERMIT REQUIRED (Check Box)	PROJECT TITLE:	WORK ORDER NUMBER:
	LOCATION:	
	GOVERNMENT PROJECT MANAGER:	
Other Permits	**PERMIT: Endangered/Species/Critical Habitat** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	
Other Permits	**PERMIT: Other** Date Obtained:	Date Closed:
☐	Basis of Decision (Yes/No):**	
	Issuing Agency:	
	Special Provisions and Requirements:**	

_____ _____

Prepared by: *Date*

Performance Assessment Plan
MONTHLY EVALUATION

MONTH: _____YEAR:_____

Evaluation Factor	Yes	No	N/A	Comments
Experience of Personnel 1. Did the team identified in the proposal actively participate in the project? 2. If personnel substitutions were needed, was the degree of technical competence maintained?				
Working Relationships 1. Did the Construction team participate in the design process (i.e. attend meetings, provide insight, etc.)? Were the coordination meetings between Construction and Design team personnel documented? 2. Did the Design team participate in the construction process (i.e. attend CQC meetings, perform field oversight, etc.)? Were coordination meetings between Construction and Design team personnel documented? 3. Did the collaboration between the Construction and Design Team deliver a high value innovative facility? - Were Total Operating Cost minimized - What LEED points can be obtained - Was energy efficiency optimized, and the energy goals exceeded. 4. Was the budget management process clear; was an estimate submitted on time with each design submittal. Was the estimate updated to reflect the changes in the design submittal? 5. Did the Contractor's team effectively manage the project budget and the User's requirements to meet the customer's needs? Was project budget and emphasis in cost control exhibited in the estimate? (Contractor to document in comments block				

materials/systems innovations and provision of higher quality than required in the RFP Part 4) *Additional factors to be developed during Partnering.*				
Quality Control 1. Were re-submittals of design deliverables or construction rework required this month? 2. Were as built redlines updated this month? *Additional factors to be developed during Partnering.*				
Timely Performance 1. Is the Contractor on schedule? 2. Is the Contractor maintaining the schedule? (Can the Government confirm the project is on schedule?) 3. Is the Contractor following his schedule? *Additional factors to be developed during Partnering.*				
Effectiveness of Management 1. Did the Government need to intercede in resolving a subcontractor issue? *Additional factors to be developed during Partnering.*				
Compliance with Labor Standards 1. Did payrolls have to be resubmitted this month due to inaccuracies or errors? *Additional factors to be developed during Partnering.*				
Compliance with Safety Standards 1. Were there any lost time accidents this month?				

Additional factors to be developed during Partnering.				

GENERAL PERFORMANCE COMMENTS THIS MONTH:

Concurrence:

CM/ROICC Representative _____Date_____.

Project Manager _____Date_____.

Contractor Representative _____Date_____.