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ARCHITECTURE
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LANDSCAPE
GRAPHICS

PROJECT MANUAL FOR

SLIDELL SENIOR CITIZEN CENTER

610 COUSIN ST
SLIDELL, LA 70458

DEMOLITION AND REPLACEMENT OF THE SLIDELL SENIOR CITIZEN CENTER

FEMA PW# 7804V3

DATE: JULY 17, 2009

PEREZ
A PROFESSIONAL CORPORATION
317 BURGUNDY STREET, SUITE 11
NEW ORLEANS, LOUISIANA 70112
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DIVISION 00 – CONTRACT REQUIREMENTS

SECTION 001000 – BIDDING DOCUMENTS

A. **Bidding Documents:** The eighteen (18) pages attached after this page represent the documents required to complete a bid on the Slidell Senior Citizens Center (Slidell Job No. 950-50J4, Bid No. 10-B11). These documents include the following sections and forms to be completed.

1. **Advertisement for Bids.**
2. **Bid Form.**
3. **Schedule of Bid Prices.**
4. **Bid Bond.**
5. **Affidavit.**
6. **Contract Form.**
7. **Performance and Payment Bond.**
8. **Instructions to Bidders.**

B. **Contractor's Responsibility:** The Contractor shall acquaint himself with the documents and the provisions therein and follow the requirements of the Advertisement for Bids, Instructions to Bidders, and other documents attached.

1. The Contractor shall notify all subcontractors, suppliers, and other parties, individuals, and agencies engaged in the Work as to their contents.
2. As part of the Bid submission, all documents required by either the Advertisement for Bids or the Instructions to Bidders shall be completed as indicated in these Bidding Documents.

C. **Contractual Adjustments:** No contractual adjustments will be permitted for failure of the Contractor to fully acquaint himself and other interested parties with the conditions of the Instructions to Bidders.

END OF SECTION 001000

ADVERTISEMENT FOR BIDS

SLIDELL SENIOR CITIZEN CENTER

SLIDELL JOB NO. 950-50J4

Bid No. 10-B011

SEALED BIDS will be received by the City of Slidell at the Office of the Finance Director, 1330 Bayou Lane Trailer 113, Slidell, Louisiana, until l0:00 A. M. Central Time on 09/09/2009, for the above referenced project, for the CITY OF SLIDELL, LOUISIANA.

The Contractor shall hold a Louisiana Contractor's license in Building Construction.

Each bid shall be accompanied by a bid bond, certified check or cashier's check for an amount equal to five percent (5%) of the total base bid. An executed affidavit must be submitted prior to bid award.

Bids will be publicly opened and read aloud. Any bid received after closing time will be returned unopened.

Contract Documents are on file at the Perez, APC 317 Burgundy St, Suite 10, New Orleans, LA 70112 and are open for public inspection.

Contract Documents may be secured by licensed contractors from **Perez, APC** upon remittance of **COST** Dollars ($300) per set. Checks should be made payable to the **Perez, APC**.

Only bids from contractors securing Contract Documents from the Engineering Department will be opened.

The signature on the bid must be that of an authorized representative of the corporation, partnership or other legal entity.

This project is funded with federal grant funds. All applicable Federal, State, Local laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

All proposals, bids and applications are welcomed. The city encourages participation by Minority, Women-Owned, and Disadvantaged Business Enterprise firms.

Deposits are refundable to bonafide prime bidders and will be 50% refundable to all others with return of complete and unmarked documents no later than 10 days after receipt of Bids.

The following question will be asked of all bidders:

Has the bidder or any of bidder's officers defaulted on a contract or ever been involved in litigation with a political subdivision of the State of Louisiana or any other state or country? _____ YES _____ NO If "YES," please supply full details.

Have any of bidder's officers been employed as an officer of an entity that has defaulted on a contract or ever been involved in litigation with a political subdivision of the State of Louisiana or any other state or country? _____ YES _____ NO If "YES," please supply full details.

The bids shall be presented in a sealed envelope clearly marked:

SEALED BIDS**:** SLIDELL SENIOR CITIZEN CENTER
SLIDELL JOB NO. 950-50J4
LOUISIANA CONTRACTOR'S LICENSE NO**.**
Bid No. 10-B011

Opening: DATE 09/09/2009
10:00 A.M.

A mandatory pre-bid meeting will be held on 08/20/2009 at 10:00 a.m. in the Slidell City Council Chambers, 1330 Bayou Lane Trailer 110, Slidell, La. This meeting will include a visit to the project site. Only those bidders in attendance will be considered as responsive bidders for this project.

The City of Slidell reserves the right to reject any or all bids and to waive informalities.

_____

Sharon Howes
CITY OF SLIDELL
Finance Director

Advertise 3 times in the St Tammany News:

Advertise: 08/05/2009
08/12/2009
08/19/2009

BID FORM

SLIDELL SENIOR CITIZEN CENTER
610 COUSIN ST SLIDELL, LA 70458

CITY OF SLIDELL, LOUISIANA

SLIDELL JOB NO. 950-50J4
Bid No. 10-B011

DATE: _____

NAME OF BIDDER: _____

_____

LA. CONTR. LICENSE NO. _____

Mayor and City Council
City of Slidell
P. O. Box 828
Slidell, LA 70459

Gentlemen:

The undersigned, being a qualified bidder in compliance with your Advertisement for Bids for the construction of:

SLIDELL SENIOR CITIZEN CENTER
CITY OF SLIDELL, LOUISIANA
SLIDELL JOB NO. 950-50J4

Having examined the Contract Documents with related documents, and having examined the sites of the proposed work, hereby proposes to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated hereinafter. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this Bid is a part. This "unit price" Bid shall be invoiced based on completed installed quantities. The undersigned Bidder agrees to fully complete the Project within **Two Hundred Seventy (270) calendar days** from the date of the "Order to Proceed." The Bidder agrees to pay as liquidated damages, the sum of One Thousand Dollars ($1000.00) for each calendar day thereafter. The Bidder further agrees that this bid shall be good and may not be withdrawn for a period of Sixty (60) calendar days after the scheduled closing time for receiving bids.

In the event the Owner issues the Notice of Award during this period, the Bid accepted shall continue to remain binding until the successful Bidder delivers his executed Contract Documents to the Owner.

The Bidder acknowledges receipt of, and makes a part of his proposal the following addenda:

Addendum No. ____ dated _____ Addendum No. ____ dated _____

Addendum No. ____ dated _____ Addendum No. ____ dated _____

Addendum No. ____ dated _____ Addendum No. ____ dated _____

Addendum No. ____ dated _____ Addendum No. ____ dated _____

Addendum No. ____ dated _____ Addendum No. ____ dated _____

The Bidder's attention is directed to the "Instructions to Bidders" contained in these contract documents. It shall be the Bidder's responsibility to review and comply with these instructions. Bidder will execute the formal contract within ten (l0) days after original date of Owner's Notice of Award and will deliver a Surety Bond or Bonds for the faithful performance of the Contract, per these drawings and specifications. A certificate of insurance shall also be delivered. Bid Security is attached without endorsement, in the sum of five percent (5%) of the total base bid
($_____

_____

_____

dollars and is to become the property of the Owner in the event the Contract and Bond are not executed within the time above set forth.

(SEAL) If bid is by a corporation

Respectfully submitted,

_____
Bidder

BY: _____

_____
Title

_____
Address

The State contract license requirement for this job is: Municipal and Public Works.

SCHEDULE OF BID PRICES

SLIDELL SENIOR CITIZEN CENTER

CITY OF SLIDELL, LOUISIANA

SLIDELL JOB NO. 950-50J4

TOTAL BASE BID PRICE:

$_____ (IN NUMERALS)

_____(IN WORDS)

BID ALTERNATE NO. 1 – Landscaping

$_____ (IN NUMERALS)

_____(IN WORDS)

Has the bidder or any of bidder's officers defaulted on a contract or ever been involved in litigation with a political subdivision of the State of Louisiana or any other state or country? _____ YES _____ NO If "YES," please supply full details.

Have any of bidder's officers been employed as an officer of an entity that has defaulted on a contract or ever been involved in litigation with a political subdivision of the State of Louisiana or any other state or country? _____ YES _____ NO If "YES," please supply full details.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____

as Principal, and _____

as Surety, are hereby held and firmly bound unto

_____ as OWNER in the penal sum of

_____for the payment of which,

well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed this _____ day of _____, 2009. The Condition of the above obligation is such that whereas the Principal has submitted to

_____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the

_____

_____

NOW, THEREFORE,

a) If said BID shall be rejected, or

b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____
Principal

_____ BY:_____
Surety

NOTE: Surety bonds shall be procured according to Louisiana State Law. Any surety bond written for a public works project shall be written by a surety or insurance company currently on the U. S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A-rating in the latest printing of the A. M. Best's Key Rating Guide to write individual bonds up to ten percent of policyholders' surplus as shown in the A. M. Best's Key Rating Guide or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds.

AFFIDAVIT

STATE OF LOUISIANA

PARISH OF _____

BEFORE ME, the undersigned authority personally came and appeared

_____, who after first being sworn, deposes and

says: that he is _____ (a partner of the firm of, etc.)

_____. The party making the foregoing Proposal or bid; that such bid is genuine and not collusive or a sham; that said bidder has not colluded, conspired, connived, or agreed directly or indirectly, with any bidder or person to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement, or collusion, or communication or conference with any person to fix the bid price of affiance or any other bidder, or to fix any overhead profit or cost element of said bid price or that of any other bidder, or to secure any advantage against THE CITY OF SLIDELL, State of Louisiana, (Owner), or any person interested in the proposed Contract; and that all statements contained in said proposal or bid, or the contents thereof, or divulged information or data relative hereto to any association or any member or agent thereof, are true.

_____

SWORN TO AND SUBSCRIBED

BEFORE ME ON THIS _____

DAY OF _____, 2009

_____
(Notary Public)

My commission expires _____.

CONTRACT FORM

FOR

SLIDELL SENIOR CENTER

CITY OF SLIDELL, LOUISIANA

SLIDELL JOB NO. 950-50J4

THIS AGREEMENT, made this _____ day of _____, 2009 at the City of Slidell, Parish of St. Tammany, State of Louisiana by and between the Mayor and City Council of the City of Slidell, Parish of St. Tammany, State of Louisiana, hereinafter called "Owner" and _____, hereinafter called the "Contractor."

WITNESSETH THAT, the Owner and Contractor do mutually agree as follows:

1. In consideration of the price for the work herein specified in the bid proposal to be paid by the Owner to the Contractor at the time and in a manner hereinafter provided, the Contractor does hereby agree to construct complete in every detail as follows:

SLIDELL SENIOR CITIZEN CENTER

CITY OF SLIDELL, LOUISIANA

SLIDELL JOB NO. 950-50J4

in compliance with the Advertisement of Bids, Proposal Form, Contract, Performance Bond, General Conditions, Specifications, Plans, and such Addenda thereto as may be issued prior to execution of this Contract, all in a thorough and workmanlike manner.

2. This price shall include the cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, transportation, and other accessories and services necessary to complete this project, in accordance with the Contract Documents.

3. The Contractor shall commence work under this Contract within **ten (l0) days** from the date of the written "Order to Proceed" issued by the Owner. The Contractor shall complete all work under the Contract within **Two Hundred Seventy (270) calendar days** from the date of the "Order to Proceed." The Owner has determined, and the Contractor agrees, that the liquidated damages for a delay in completion of this Contract will be **One Thousand Dollars ($1000.00**) per calendar day in excess of the stated time of completion.

4. That upon satisfactory completion of the work and approval by the Engineer, the Owner will issue a written acceptance of the work to the Contractor, who will immediately thereafter file same with the Recorder of Mortgages in St. Tammany Parish.

5. A retainage of ten percent (10%) shall be withheld from each progress payment. Upon successful clearance of the lien, the Contractor shall submit a final invoice, with the clear lien certificate, for payment by the Owner in accordance with invoice payment procedures outlined in Article 14.13 Final Payment. The retainage amount for contracts $500,000.00 or greater shall be five percent (5%).

6. The Owner agrees to pay the Contractor for the performance of the Contract as provided in the Specifications, and to make monthly payments on account thereof provided in the General Conditions. The contract amount, as presented in bid by Contractor, is $ _____ ___.

7. Owner and Contractor specifically agree and declare that Owner shall be deemed and considered the statutory employer of Contractor's employees.

8. Contractor agrees to comply with the following Federally Funded project requirements:

FEDERAL COMPLIANCE REGULATIONS

Federal regulations apply to all City of Slidell contracts using Federal funds as a source for the solicitation of goods and services. Contractor must comply with the following Federal requirement as applicable:

ACCESS BY THE GRANTEE, SUBGRANTEE, FEDERAL GRANTOR AGENCY AND COMPTROLLER GENERAL

The Contractor shall allow access by the Grantee, Subgrantee, Federal grantor agency and Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers, and records of the Contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts and transcriptions.

CLEAN AIR AND WATER ACTS

The Contractor shall comply with all applicable standards, orders, or requirements issued under section 306 of the clean Air Act (42 U.S.C. 1857 (h», section 508 of the Clean Water Act (33 U.S.C. 1386), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15). (Contracts, subcontracts, and subgrants of amounts in excess of $100,000).

CONTRACT WORK HOURS AND SAFETY STANDARDS

The Contractor shall comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor regulations (29 CFR Part 5). (Construction contracts awarded by Grantees and Subgrantees in excess of $2,000, and in excess of $2.500 for other contracts which involve the employment of mechanics or laborers).

COPELAND ANTI-KICKBACK ACT

The Contractor shall comply with the Copeland Anti-Kickback Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3). (All contracts and subgrants for construction or repair).

COPYRIGHTS

The Grantee and Subgrantee is free to copyright original work developed in the course of or under the agreement. The Grantor reserves a royalty-free, nonexclusive and irrevocable right to reproduce, publish or otherwise use, and to authorize others to use the work for Government purposes. Publication resulting from work performed under this agreement shall include an acknowledgement of Grantor financial support, by grant number, and a statement that the publication does not constitute an endorsement by Grantor or reflect Grantor's views.

DAVIS-BACON ACT

Contractor shall comply with the Davis-Bacon Act (40 U.S.C. 276a to a-7) as supplemented by Department of Labor regulations (29 CFR Part 5).

DISADVANTAGE BUSINESS ENTERPRISES (DBE) CONTRACTORS
The contractor agrees to ensure that Disadvantage Business Enterprises as defined in 49 CFR, Part 23, as amended, have the maximum opportunity to participate in the performance of contracts and this agreement. In this regard, contractor shall take all necessary and reasonable steps in accordance with 49 C.F.R., Part 23, as amended, to ensure that the Disadvantaged Business Enterprises have the maximum opportunity to compete for and perform contracts. The contractor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of federal assisted contracts.

ENERGY POLICY AND CONSERVATION ACT
The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163).

EQUAL EMPLOYMENT OPPORTUNITY
The Contractor shall comply with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR Chapter 60). (All construction contracts awarded in excess of $10,000 by Grantees and their Contractors or Subgrantees).

LOBBYING
The Contractor shall comply with the provisions of 31 U.S.C. 1352 regarding lobbying.

PATENTS
Grantee and Subgrantee assures that if any grant or subgrant produces patents, patent rights. Processes or inventions, a report shall be made to the appropriate agency from which a determination will be made as to whether protection of such invention or discovery is necessary in accordance with President’s Memorandum of August 23, 1971 (36 P.R. 16889).

REMEDIES
Louisiana law provides for legal remedies and appropriate sanctions and penalties in instances where the Contractor is in violation of or breaches the contract terms.

REPORTING
Reports Submission: Per 44 CFR 13.50, when the appropriate grant award performance period expires, the Grantee shall submit the following documents within 90 days: (1) Financial performance or Progress Report; (2) Financial Status Report (SF 269) or Outlay Report and Request for Reimbursement for Construction Programs (SF-271) (as applicable); (3) Final request for payment (SF-270) (if applicable); (4) Invention disclosure (if applicable); and (5) Federally-owned property report.

REPORTS
The Contractor shall submit, at such times and in such form as may be prescribed, such reports as Grantor may require, including monthly or quarterly progress reports, quarterly program income reports, and final fiscal reports and annual performance reports.

RETENTION OF ALL RECORDS
The Contractor is required to retain all records for three (3) years after grantees or subgrantees make final payments and all other pending matters are closed.

TERMINATION FOR CAUSE
This Contract may be terminated for cause based upon failure of Contractor to comply with the terms and/or conditions of the Contract provided that the City shall give Contractor written notice specifying Contractor’s failure. If within thirty (30) days after receipt of such notice, Contractor shall not have either corrected such failure or, in the case the failure cannot be corrected in thirty (30) days, begun in good faith to correct said failure and thereafter proceeded diligently to complete such correction, then the City may, at its option, place Contractor in default and the Contract shall terminate on the date specified in the notice. Contractor may exercise any rights available to in under Louisiana law to terminate for cause upon the failure of the City to comply with the term and/or conditions of

this Contract provided that Contractor shall give the City written notice specifying the City's failure and a reasonable opportunity for the City to remedy the failure. [HUD, DOJ]

TERMINATION FOR CONVENIENCE
This Contract may be terminated at any time for the convenience of the City. If this clause is executed, the City shall pay Contractor for all work completed through the termination date, as well as any demobilization costs that are a part of this Contract.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed in **six (6)** original counterparts on the day and year first hereinabove written.

WITNESSES:

_____ _____
Contractor

_____ _____
Signature

_____
Title

WITNESSES: CITY OF SLIDELL
Owner

_____ _____
Signature

_____ Mayor
Title

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we (l) *

_____ and (2) *

_____hereinafter called "Principal" and (3) *

_____ a Surety Company authorized to do and doing business in the State of Louisiana, hereinafter called "Surety" are held and firmly bound unto the Mayor of the City of Slidell, Louisiana, hereinafter called "Owner" in penal sums of _____ dollars ($_____) Performance Bond and _____ dollars ($_____) Payment Bond in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that, whereas, the Principal entered into a certain contract with the Owner dated the _____ day of _____, 2009, a copy of which is hereto attached and made a part hereof for the furnishing of:

SLIDELL SENIOR CITIZEN CENTER
SLIDELL JOB NO. 950-50J4

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof which may be granted by the owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, and shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment, and tools, consumed or used in connection with the prosecution of such work, and all insurance premiums on said work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alterations or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in anywise affect its obligation on this bond, and it does hereby waive

notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work of the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is execute in **Six (6)** originals each one of which shall be deemed an original, this the _____ day of _____, 2009.

ATTEST: _____ _____
(Principal Secretary) Principal

BY: _____

_____

_____
Address

_____
Witness as to Principal

_____
Address

ATTEST:

_____
(Surety) Secretary

(SEAL)

_____
Surety

_____ BY: _____
Witness as to Surety Attorney-in-Fact

_____ _____
Address Address

NOTE: DATE OF BOND MUST NOT BE PRIOR TO DATE OF THIS AGREEMENT.

* 1. Correct name of Contractor.
* 2. A Corporation, a partnership, or an Individual, as case may be.
* 3. Correct name of Surety.

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

Terms used in these Instructions to Bidders which are defined in the Standard General Conditions of the Construction Specifications have the meanings assigned to them in the General Conditions.

2. QUALIFICATIONS OF BIDDERS

To demonstrate his qualifications for the Project, each Bidder must be prepared to submit within five days of Owner's request written evidence of the types set forth in the Supplementary Conditions or General Conditions, such a financial data, previous experience and evidence of authority to conduct business in the jurisdiction where the Project is located.

3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

3.1 Before submitting his Bid, each bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect performance of the Work, (c) familiarize himself with Federal, State and local laws, ordinances, rules and regulations affecting performance of the Work; and (d) carefully correlate his observations with the requirements of the Contract Documents.

3.2 NOT USED

3.3 The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this Article 3.

4. INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted to Engineer in writing. Replies will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the bidding documents. Questions received less than five days prior to the date of opening of Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5. BID SECURITY

The amount and type of Bid Security is stated in the Invitation to bid. The required security must be in the form of a certified or bank cashier's check made payable to Owner or a bid bond issued by a surety licensed to conduct business in the state. Surety bonds shall be procured according to Louisiana State Law. Any surety bond written for a public works project shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A rating in the latest printing of the A. M. Best's Key Rating Guide to write individual bonds up to ten percent of

policyholders' surplus as shown in the A. M. Best's Key Rating Guide. The Bid Security of the successful Bidder will be retained until he has executed the Agreement and furnished the required Contract Security, whereupon it will be returned; if he fails to execute Security within 10 days of the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the executed Agreement is delivered by Owner to Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.

6. CONTRACT TIME

The number of days for the completion of Work (the Contract Time) is set forth in the Bid Form and will be included in the executed Agreement. Any provisions for liquidated damages are set forth in the Contract Documents. The contract time is established in calendar days.

7. SUBCONTRACTORS, ETC.

7.1 If the Supplementary Conditions or Specifications require the identity of certain Subcontractors and other persons and organizations to be submitted to Owner in advance of the Notice of Award, the apparent low Bidder, any other Bidder so requested, will within seven days after the day of the Bid opening submit to Owner a list of all Subcontractors and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the Work as to which such identification is so required. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each such Subcontractor, person and organization if requested by Owner. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, other person or organization, he may before giving the Notice of Award request the apparent low Bidder to submit an acceptable substitute without an increase in his Bid price. If the apparent low Bidder declines to make any such substitution, he will not thereby sacrifice his Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.

7.2 In contracts where the Contract Price is on the basis of Cost of the Work Plus a Fee, Contractor, prior to the Notice of Award, must identify in writing the Owner those portions of the Work that he proposes to subcontract and after the Notice of Award may only subcontract other portions of the Work with Owner's written consent.

7.3 Contractor shall not be required to employ any Subcontractor, other person or organization against whom he has reasonable objection.

8. BID FORM

8.1 The Bid Form is included in the Contract Documents; additional copies may be obtained from Engineer.

8.2 Bid Forms must be completed in ink or by typewriter. The Bid price of each item on the form must be stated in numerals. In case of mathematical discrepancies the unit price shall take precedence. When the bid price is requested in words and figures, this shall be done. In case of a discrepancy in these prices, the words shall take precedence.

8.3 The authority of the person submitting the bid shall be deemed sufficient and acceptable provided that any of the following conditions are met:

1. The signature on the bid is that of any corporate officer listed on the most current annual report on file with the secretary of state, or the signature on the bid is that of any member of a partnership or partnership in commendam listed in the most current partnership records on file with the secretary of state; or
2. The signature on the bid is that of an authorized representative of the corporation, partnership, or other legal entity and the bid is accompanied by a corporate resolution, certification as to the corporate principal, or other documents indicating authority which are acceptable by the City; or
3. The corporation, partnership, or other legal entity has filed in the appropriate records of the secretary of state, an affidavit, resolution, or other acknowledged or authentic document indicating the names of all persons authorized to submit bids for public contracts.

8.4 Bids by partnerships must be executed in the partnership name and signed by a partner, his title must appear under this signature and the official address of the partnership must be shown below the signature.

8.5 All names must be typed or printed below the signature.

8.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

8.7 An executed affidavit, contained in the contract documents, shall be submitted prior to bid award.

9. SUBMISSION OF BIDS

Bids shall be submitted at the time and place indicated in the Invitation for Bid and shall be submitted in an opaque sealed envelope, marked with the Project title, name and address of the Bidder, Contractor's license number for state in which the work is to be done, and accompanied by the Bid Security and other required documents.

10. MODIFICATION AND WITHDRAWAL OF BIDS

Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

11. OPENING OF BIDS

Bids shall be opened as indicated in the Invitation to Bid.

12. BIDS TO REMAIN OPEN

All Bids shall remain open for the period of time stated in the Bid Form after the day of the Bid Opening, but Owner may, in his sole discretion, release any Bid and return the Bid Security prior to that date.

13. AWARD OF CONTRACT

13.1 Owner reserves the right to reject any and all Bids and Waive any and all informalities, and the right to disregard all nonconforming or conditional Bids or counter proposals.

13.2 In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and unit prices if requested in the Bid forms. He may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the Work as to which the identity of Subcontractors and other persons and organizations to do the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

13.3 If a contract is to be awarded, it will be awarded to the lowest responsible Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project and the Owner.

13.4 If the contract is awarded, Owner will give the apparent successful Bidder a Notice of Award within the time period specified for the Bid to be binding in the Bid Form.

13.5 Simultaneously with delivery of the executed counterparts the agreement to Owner, Contractor shall deliver to Owner the required Contract Security.

SECTION 007000 – GENERAL CONDITIONS

A. General Conditions: General Conditions, Articles 1 through 19 inclusive, on pages GC-1 through GC-36, as provided by the City of Slidell, are the General Conditions of this Contract and are bound into this Project Manual following this page.

B. Contractor's Responsibility: The Contractor shall acquaint himself with the provisions of the General Conditions and notify all subcontractors, suppliers, and other parties, individuals, and agencies engaged in the Work as to their contents.

C. Contractual Adjustments: No contractual adjustments will be permitted for failure of the Contractor to fully acquaint himself and other interested parties with the conditions of General Conditions supplied by the City of Slidell.

END OF SECTION 007000

GENERAL CONDITIONS

ARTICLE 1--DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

ADDENDA--Addenda include additions and changes to plans or specifications issued by the Engineer prior to the reception of bids, and must be considered by the Contractor as a part of the original plans and specifications. Upon signing of the Contract, all Addenda will be included as a part of the contract documents.

ADVERTISEMENT--The advertisement published by the Owner giving notice of a request for bids.

AGREEMENT--The written agreement between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement.

APPLICATION FOR PAYMENT--The form furnished by Engineer which is to be used by Contractor in requesting progress payments and which is to include the schedule of values required by Paragraph 14.1 and an affidavit of Contractor that progress payments theretofore received on account of the Work have been applied by Contractor to discharge in full all of Contractor's obligations reflected in prior Applications for Payment.

BID--The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER--Any person, firm or corporation submitting a Bid for the Work.

BONDS--Bid, performance and payment bonds and other instruments of security, furnished by Contractor and his surety in accordance with the Contract Documents.

CHANGE ORDER--A written order to Contractor signed by Owner authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued after execution of the Agreement.

CONTRACT DOCUMENTS--The Agreement, Addenda (whether issued prior to the opening of Bids or the execution of the Agreement), Instructions to Bidders, Contractor's Bid, the Bonds, the Notice of Award, these General Conditions, the Supplementary Conditions, the Specifications, Drawings, Modifications, and Change Orders.

CONTRACT PRICE--The total monies payable to Contractor under the Contract Documents.

CONTRACT TIME--The number of days stated in the Agreement for the completion of the work, computed as provided in Paragraph 17.2.

CONTRACTOR--The person, firm or corporation with whom Owner has executed the Agreement.

DAY--A calendar day of twenty-four hours measured from midnight to the next midnight.

DRAWINGS--The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by Engineer and are referred to in the Contract Documents.

ENGINEER--The person, firm or corporation named as such in the Agreement.

FIELD ORDER--A written order issued by Engineer which clarifies, or interprets the Contract Documents in accordance with Paragraph-9.3 or orders minor changes in the Work in accordance with Paragraph 10.2.

MODIFICATION--(a) A written amendment of the Contract Documents signed by both parties, (b) a Change Order, (c) a written clarification or interpretation issued by Engineer in accordance with Paragraph 9.3 or (d) a written order for a minor change or alteration in the Work issued by Engineer pursuant to Paragraph 10.2. A Modification may only be issued after execution of the Agreement.

NOTICE OF AWARD--The written notice by Owner to the apparent successful Bidder stating that upon compliance with the conditions precedent to be fulfilled by him within the time specified; Owner will execute and deliver the Agreement to him.

NOTICE TO PROCEED--A written notice given by Owner to Contractor (with a copy to Engineer) fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform his obligations under the Contract documents.

OWNER--A public body or authority, corporation, association, partnership, or individual for whom the Work is to be performed.

PLANS--The Plans, cross sections, working drawings and supplemental drawings, or exact reproductions thereof, which show the locations, character, dimensions, and details of the work to be done, and which are to be considered as a part of the contract, supplementary to these specifications.

PROJECT--The entire construction to be performed as provided in the Contract Documents.

RESIDENT PROJECT REPRESENTATIVE--The authorized representative of Engineer who is assigned to the Project site or any part, thereof.

SHOP DRAWINGS--All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by Contractor, Sub-contractor, manufacturer, supplier or distributor and which illustrate the equipment, material or some portion of the Work.

SPECIFICATIONS--Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work. The Specifications shall be considered to generally include, but not limited to, the contract documentation forms, the general conditions, supplemental conditions, technical specifications, and any addenda.

SUBCONTRACTOR--An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

SUBSTANTIAL COMPLETION--The date as certified by the engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it was intended; or if there be no such certification, the date when final payment is due in accordance with Paragraph 14.13.

WORK--Any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by Contractor per the Contract Documents, including all labor, materials, equipment and other incidentals, and the furnishing thereof.

ARTICLE 2--PRE-CONSTRUCTION PROVISIONS

2.0 Award of Contract

The award of the Contract, if it be awarded, will be by the Owner to the lowest responsible Bidder whose Proposal shall have complied with all the requirements necessary to render it formal. The successful Bidder will be notified by telegram or letter mailed to the address shown on his Proposal that his bid has been accepted and that he has been awarded the Contract. No award will be made to any Contractor until their bond and insurance requirements are made satisfactory to the Owner.

EXECUTION OF AGREEMENT:

2.1 At least the number of counterparts specified in the contract form of the Agreement and such other Contract Documents as practicable will be executed and delivered by Contractor to Owner within fifteen days of the Notice of Award; and Owner will execute and deliver one counterpart to Contractor within ten days of receipt of the executed Agreement from Contractor. Engineer will identify those portions of the Contract Documents not so signed and such identification will be binding on all parties. Owner, Contractor and Engineer shall each receive an executed counterpart of the Contract Documents and additional confirmed copies as required.

DELIVERY OF BONDS:

2.2 When he delivers the executed Agreements to Owner, Contractor shall also deliver to Owner such Bonds as may be required in accordance with Paragraph 5.1.

COPIES OF DOCUMENTS:

2.3 Owner shall furnish to Contractor up to three (3) copies (unless otherwise provided in the Supplementary Conditions) of the Contract Documents. Additional copies will be furnished, upon request, at the cost of reproduction.

CONTRACTOR'S PRE-START REPRESENTATIONS:

2.4 Contractor represents that he has familiarized himself with, and assumes full responsibility for having familiarized himself with, the nature and extent of the Contract Documents, Work, locality, and with all local conditions and Federal, state and local laws, ordinances, rules and regulations that may in any manner affect performance of the Work, and represents that he has correlated his study and observations with the requirements of the Contract Documents. Contractor also represents that he has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the General Conditions of the Specifications and made such additional surveys and investigations as he deems necessary for the performance of the work at the Contract Price in accordance with the requirements of the Contract Documents and that he has correlated the results of all such data with the requirements of the Contract Documents.

COMMENCEMENT OF CONTRACT TIME: NOTICE TO PROCEED:

2.5 The Contract Time will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the day on which Owner delivers the executed Agreement to Contractor.

STARTING THE PROJECT:

2.6 Contractor shall start to perform his obligations under the Contract Documents within ten (10) days of the date when the Contract Time commences to run. No Work shall be done at the site prior to the date on which the Contract Time commences to run.

BEFORE STARTING CONSTRUCTION:

2.7 Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. He shall at once report in writing to Engineer any conflict, error or discrepancy which he may discover; however, he shall not be liable to Owner or Engineer for his failure to discover any conflict, error or discrepancy in the Drawings or Specifications.

2.8 Within ten (10) days of delivery of the executed Agreement by Owner to Contractor, Contractor shall submit to Engineer for approval, an estimated progress schedule indicating the starting and completion dates of the various stages of the Work, and a preliminary schedule of Shop Drawing submissions.

2.9 Before starting the Work at the site, Contractor shall furnish Owner and Engineer certificates of insurance as required by Article 5. Within twenty (20) days after delivery of the executed Agreement by Owner to Contractor, but before starting the Work at the site, a conference will be held to review the above schedules, to establish procedures for handling Shop Drawings and other submissions and for processing Applications for Payment, and to establish a working understanding between the parties as to the Project. Present at the conference will be Owner or his representative, Engineer, Resident Project Representatives, Contractor and his Superintendent.

ARTICLE 3--CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

3.1 It is the intent of the Contract Documents to describe the work. The work to be done under the Contract shall consist of the complete construction of each and every unit described in the plans, these General Specifications, the Construction Specifications, the Special Provisions, Contract and Notice to Contractors, together with all authorized alterations. The Contractor shall furnish and provide, unless definitely and expressly stated to the contrary in the Proposal and Special Provisions or the Plans, all materials, implements, machinery, equipment, tools, supplies, transportation and labor necessary to the prosecution and completion of the Work. Should any discrepancies exist between the Drawings and the Specifications, or any part of either or should any parts of the Specifications or of the Contract be ambiguous or doubtful, the Engineer shall decide as to the true intent and meaning. Any work necessary to be performed after regular working hours, on Sundays or Legal Holidays, shall be performed without additional expense to the Owner. The work shall be scheduled to be performed on a standard Monday through Friday work week.

3.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If Contractor finds a conflict, error or discrepancy in the Contract Documents, he shall call it to Engineer's attention in writing at once and before proceeding with the Work affected thereby; however, he shall not be liable to Owner or Engineer for his failure to discover any conflict, error or discrepancy in the Specifications or Drawings. In resolving such conflicts, errors and discrepancies, the documents shall be given precedence in the following order:

Agreement, Modifications, Addenda, Supplementary Conditions Instructions to Bidders, General Conditions, Specifications and Drawings. Figure dimensions on Drawings shall

govern over scale dimensions, and detailed Drawings shall govern over general Drawings. Any work that may reasonably be inferred from the Specifications or Drawings as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

ARTICLE 4--AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

AVAILABILITY OF LANDS:

4.1 Owner shall furnish, as indicated in the Contract Documents and not later than the date when needed by Contractor, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by Owner, unless otherwise specified in the Contract Documents. If Contractor believes that any delay in Owner's furnishing these lands or easements entitles him to an extension of the Contract Time, he may make a claim therefore as provided in Article 12. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

PHYSICAL CONDITIONS--SURVEYS AND REPORTS

4.2 The Engineer shall provide, upon request available surveys and investigation reports of subsurface and latent physical conditions at the Project site which have been relied upon by Engineer in preparation of the Drawings and Specifications.

UNFORSEEN PHYSICAL CONDITIONS

4.3 Contractor shall promptly notify Owner and Engineer in writing of any subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents or anticipated in the design of the Project. Engineer will promptly investigate those conditions and advise Owner in writing if further surveys or subsurface tests are necessary. Promptly thereafter, Owner shall obtain the necessary additional surveys and tests and furnish copies to Engineer and Contractor. If Engineer finds that the results of such surveys or tests indicated that there are subsurface or latent physical conditions which differ materially from those intended in the Contract Documents, and which could not reasonably have been anticipated by Contractor, a Change Order shall be issued incorporating the necessary revisions. Any claims for additional time or compensation as a result of any latent condition shall be presented to the Owner and Engineer promptly in writing.

REFERENCE POINTS

4.4 Owner shall provide engineering surveys for construction to establish reference points which in his judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for surveying and laying out the Work (unless otherwise provided), and shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of Owner. He shall report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. Contractor shall replace and accurately relocate all reference points so lost, destroyed, or moved.

ARTICLE 5--BONDS AND INSURANCE

PERFORMANCE, PAYMENT AND OTHER BONDS

5.1 Contractor shall furnish performance and payment Bonds as security for the faithful performance and payment of all his obligations under the Contract Documents. These Bonds shall be in amounts at least equal to the Contract Price, and (except as otherwise provided) in such form and with such sureties as are licensed to conduct business in the state where the Project is located and are named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U. S. Treasury Department, or by a Louisiana domiciled insurance company with at least an A rating in the latest printing of A. M. Best's Key Rating Guide and in accordance with Louisiana R. S. 38:2219.

5.2 If the surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located is revoked, Contractor shall within five days thereafter substitute another Bond and surety, both of which shall be acceptable to Owner.

CONTRACTOR'S LIABILITY INSURANCE

5.3 Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, and claims insured by usual personal injury liability coverage; from claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees including claims insured by usual personal injury liability coverage; and from claims for injury to or destruction of tangible property, including loss of use resulting therefrom--any or all of which may arise out of or result from Contractor's operations under the Contract Documents, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. This insurance shall include the specific coverages and be written for not less than any limits of liability and maximum deductibles specified in the Supplementary Conditions or General Conditions or required by law, whichever is greater, shall include contractual liability insurance and shall include Owner and Engineer as additional insured parties. Before starting the work, Contractor shall file with Owner and Engineer, certificates of such insurance acceptable to Owner; these certificates shall contain a provision that the coverage afforded under the policies will not be canceled or materially changed until at least fifteen days prior written notice has been given to Owner and Engineer.

OWNER'S LIABILITY INSURANCE

5.4 Owner shall be responsible for purchasing and maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims which may arise from operations under the Contract Documents.

PROPERTY INSURANCE

5.5 Unless otherwise provided, Owner shall purchase and maintain property insurance upon the project to the full insurable value thereof. The insurance shall include the interests of Owner, Contractor and Subcontractors in the Work, shall insure against the periods of Fire, Extended Coverage, vandalism and Malicious Mischief and such other perils as may be specified in the Supplementary Conditions or General Conditions and shall include

damages, losses and expenses arising out of or resulting from any insured loss; or incurred in the repair or replacement of any insured property (including fees and charges of engineers, architects, attorneys and other professionals.

5.6 Owner shall purchase and maintain such steam boiler and machinery insurance as may be required by the Supplementary Conditions or by law. This insurance shall include the interests of Owner, Contractor and Subcontractors in the Work.

5.7 Any insured loss under the policies of insurance required by Paragraphs 5.5 and 5.6 is to be adjusted with Owner and made payable to Owner as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage.

5.8 Not Used

5.9 Not Used

5.10 Owner and Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by insurance provided under Paragraphs 5.5 through 5.11, inclusive. Contractor shall require similar waivers by Subcontractors in accordance with Paragraph 6.12.

5.11 Not Used

ADDITIONAL BONDS AND INSURANCE

5.12 Prior to delivery of the executed Agreement by Owner to Contractor, Owner may require Contractor to furnish such other Bonds and such additional insurance, in such form and with such sureties or insurers as Owner may require. If such other Bonds or such other insurance are specified by written instructions given prior to opening of Bids, the premiums shall be paid by Contractor; if subsequent thereto, they shall be paid by Owner (except as otherwise provided in Paragraph 6.7). Maintenance bonds as provided in Section 14.17 shall be provided to the Owner at the completion of the project and at Contractor's expense.

ARTICLE 6--CONTRACTOR’S RESPONSIBILITIES

SUPERVISION AND SUPERINTENDENCE:

6.1 Contractor shall supervise and direct the Work efficiently and with his best skill and attention. He shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but he shall not be solely responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

6.2 Contractor shall keep on the work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.

LABOR, MATERIALS AND EQUIPMENT:

6.3 Contractor shall provide competent, suitably qualified personnel to survey and lay out the work and perform construction as required by the Contract Documents. He shall at all times maintain good discipline and order at the site.

6.4 Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the work.

6.5 All materials and equipment shall be new, except as Otherwise provided in the Contract Documents. If required by Engineer, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

6.6 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Contract Documents.

SUBSTITUTE MATERIALS OR EQUIPMENT:

6.7 If the General Conditions of the Specifications, law, ordinance, or applicable rules or regulations permit Contractor to furnish or use a substitute that is equal to any material or equipment specified, and if Contractor wishes to furnish or use a proposed substitute, he shall, prior to the conference called for by Paragraph 2.9 (unless another time is provided in the General Conditions), make written application to Engineer for approval of such a substitute certifying in writing that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified; stating whether or not its incorporation in or use in connection with the Project is subject to the payment of any license fee or royalty; and identifying all variations of the proposed substitute from that specified and indicating available maintenance service. No substitute shall be ordered or installed without the written approval of Engineer who will be the judge of equality and may require Contractor to furnish such other data about the proposed substitute as he considers pertinent. No substitute shall be ordered or installed without such performance guarantee and bonds as Owner may require which shall be furnished at Contractor's expense.

CONCERNING SUBCONTRACTORS:

6.8 Contractor shall not employ any Subcontractor or other person or organization (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. A Subcontractor or other person or organization identified in writing to Owner and Engineer by Contractor prior to the Notice of Award and not objected to in writing by Owner or Engineer prior to the Notice of Award will be deemed acceptable to Owner and Engineer. Acceptance of any Subcontractor, other person or organization by Owner or Engineer shall not constitute a waiver of any right of Owner or Engineer to reject defective Work or Work not in conformance with the Contract Documents. If Owner or Engineer after due investigation has reasonable objection to any Subcontractor, other person or organization proposed by Contractor after the Notice of Award, Contractor shall submit an acceptable substitute and the Contract Price shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order shall be issued. Contractor shall not be required to employ any Subcontractor, other person or organization against whom he has reasonable objection. Contractor shall not without the consent of Owner and Engineer make any substitution for any Contractor, other person or organization who has been

accepted by Owner and Engineer unless Engineer determines that there is good cause for doing so.

6.9 Contractor shall be fully responsible for all acts and omissions of his Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between Owner or Engineer and any Subcontractor or other person or organization having a direct contract with Contractor, nor shall it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any monies due any Subcontractor or other person or organization, except as may otherwise be required by law. Owner or Engineer may furnish to any Subcontractor or other person or organization, to the extent practicable, evidence of amounts paid to Contractor on account of specific Work done in accordance with the schedule of values.

6.10 The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or delineating the Work to be performed by any specific trade.

6.11 Contractor agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of Owner.

6.12 All work performed for Contractor by a Subcontractor shall be pursuant to an appropriate agreement between Contractor and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance provided in accordance with Paragraphs 5.5 through 5.11, inclusive, Contractor shall pay each Subcontractor a just share of any insurance monies received by Contractor under Paragraphs 5.5 through 5.11, inclusive.

PATENT FEES AND ROYALTIES:

6.13 Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents. Contractor shall indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorneys' fees) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

PERMITS:

6.14 Contractor shall obtain and pay all construction permits and licenses and shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of his Bid. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall also pay all public utility charges.

LAWS AND REGULATIONS:

6.15 Contractor shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If Contractor observes that the Specifications or Drawings are at variance therewith, he shall give Engineer prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate Modification. If Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to Engineer, he shall bear all costs arising therefrom; however, it shall not be his primary responsibility to make certain that the Specifications and Drawings are in accordance with such laws, ordinances, rules and regulations.

TAXES:

6.16 Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by him in accordance with the law of the place where the Work is to be performed.

USE OF PREMISES:

6.17 Contractor shall confine his equipment, the storage of materials and equipment and the operations of his workmen to areas permitted by law, ordinances, permits, or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with materials or equipment.

6.18 Contractor shall not load nor permit any part of any structure to be loaded with weights that will endanger the structure, nor shall he subject any part of the Work to stresses or pressures that will endanger it.

RECORD DRAWINGS:

6.19 Contractor shall keep on record copy of all Specifications, Drawings, Addenda, Modifications, and Shop Drawings at the site in good order and annotated to show all changes made during the construction process. These shall be available to Engineer and shall be delivered to him for Owner upon completion of the Project.

SAFETY AND PROTECTION:

6.20 Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1 All employees on the Work and other persons who may be affected thereby,

6.20.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and

6.20.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for its safety and protection. He shall notify owners of adjacent utilities when prosecution of the Work may affect them. All damages, injury or loss to any property referred to in Paragraph 6.20.2 or 6.20.3 caused, directly or

indirectly, in a whole or in part, by Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by Contractor; except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.13 that Work is acceptable and complete.

6.21 Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to Owner.

EMERGENCIES:

6.22 In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, Contractor without special instruction or authorization from Engineer or Owner, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. He shall give Engineer prompt written notice of any significant changes in the work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved. If Contractor believes that additional work done by him in an emergency which arose from causes beyond his control entitles him to an increase in the Contract Price or an extension of the Contract Time, he my make a claim thereof as provided in Articles 11 and 12.

SHOP DRAWINGS AND SAMPLES:

6.23 After checking and verifying all field measurements, Contractor shall submit to Engineer for approval, in accordance with the accepted schedule of Shop Drawings submissions (see Paragraph 2.8), five copies (or Engineer's option, one reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of Contractor and identified as Engineer may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable Engineer to review the information as required.

6.24 Contractor shall also submit to Engineer for approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

6.25 At the time of each submission, Contractor shall in writing call Engineer's attention to any deviations that the Shop Drawings or sample may have from the requirements of the Contract Documents.

6.26 Engineer will review and approve with reasonable promptness Shop Drawings and samples, but his review and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The Approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and re-submit new samples until approved. Contractor shall direct specific attention in writing or on re-submitted Shop Drawings to revisions other than the corrections called for by Engineer on previous

submissions. Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner and Engineer that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.

6.27 Where a Shop Drawing or sample submission is required by the Specifications, no related Work shall be commenced until the submission has been approved by Engineer. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by Contractor at the site and shall be available to Engineer.

6.28 Engineer's approval of Shop Drawings or sample shall not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents, unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any approval by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings.

CLEANING:

6.29 Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the work, and at the completion of the Work he shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by Owner. Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

INDEMNIFICATION:

6.30 Contractor shall indemnify and hold harmless Owner and Engineer and their agents and employees from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable regardless of whether or not it is caused in part by a party indemnified hereunder.

6.31 In any and all claims against Owner or Engineer or any of their agents or employees by any employee of Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.30 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.32 The obligations of Contractor under Paragraph 6.30 shall not extend to the liability of Engineer, his agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications or (b) the giving of or the failure to give directions or instructions by Engineer, his agents or employees provided such giving or failure to give is the primary cause of injury or damage.

ARTICLE 7--WORK BY OTHERS

7.1 Owner may perform additional work related to the Project by himself, or he may let other direct contracts therefore which shall contain General Conditions similar to these. Contractor shall afford the other contractors who are parties to such direct contracts (or Owner, if he is performing the additional work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate his Work with theirs.

7.2 If any part of Contractor's Work depends for proper execution or results upon the work of any such other contractor (or Owner), Contractor shall inspect and promptly report to Engineer in writing any defects or deficiencies in such work that render it unsuitable for such proper execution and results. His failure to so report shall constitute an acceptance of the other work as fit and proper for the relationship of his work except as to defects and deficiencies which may appear in the other work after the execution of his Work.

7.3 Contractor shall do all cutting, fitting, and patching of his Work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. Contractor shall not endanger any work of other by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and of the other contractors whose work will be affected.

7.4 If the performance of additional work by other contractors or Owner is not noted in the Contract Documents prior to the execution of the contract, written notice thereof shall be given to Contractor prior to starting any such additional work. If contractor believes that the performance of such additional work by Owner or others involves him in additional expense or entitles him to an extension of the Contract Time, he may make a claim therefore as provided in Articles 11 and 12.

ARTICLE 8--OWNER'S RESPONSIBILITIES

8.1 Owner shall issue all communications to Contractor through Engineer.

8.2 In case of termination of the employment of Engineer, Owner shall appoint an engineer against whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer. Any dispute with such appointment by the Contractor must be in writing to the Owner.

8.3 Owner shall furnish the data required of him under the Contract Documents promptly and shall make payments to Contractor promptly after they are due as provided in Paragraphs 14.4 and 14.13.

8.4 Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.1 and 4.4. Paragraph 4.2 refers to Owner's identifying and making available to Contractor copies of surveys and investigation reports of subsurface and latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by Engineer in preparing the Drawings and Specifications.

8.5 Owner's responsibilities in respect of liability and property insurance are set forth in Paragraph 5.4 and 5.5.

8.6 In addition to his rights to request changes in the Work in accordance with Article 10, Owner (especially in certain instances as provided in Paragraph 10.4) shall be obligated to execute Change Orders.

8.7 Owner's responsibility in respect of certain inspections, tests and approvals is set forth in Paragraph 13.2.

8.8 In connection with Owner's right to stop Work or suspend Work, see Paragraphs 13.8 and 15.1. Paragraph 15.2 deals with Owner's right to terminate services of Contractor under certain circumstances.

ARTICLE 9--ENGINEER'S STATUS DURING CONSTRUCTION

OWNER'S REPRESENTATIVE:

9.1 Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in these General Conditions and shall not be extended without written consent of Owner and Engineer.

VISITS TO SITE:

9.2 Engineer

Engineer will make periodic visits to the site to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. He will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work. His efforts will be directed toward providing assurance for Owner that the completed Project will conform to the requirements of the Contract Documents. On the basis of his on-site observations as an experienced and qualified design professional, he will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work of contractors.

CLARIFICATIONS AND INTERPRETATIONS

9.3 Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents (in the form of Drawings or otherwise) as he may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If Contractor believes that a written clarification and interpretation entitles him to an increase in the Contract Price, he may make a claim therefore as provided in Article 11.

REJECTING DEFECTIVE WORK:

9.4 Engineer will have authority to disapprove or reject Work which is "defective" (which term is hereinafter used to describe work that is unsatisfactory, faulty or defective, or does not conform to the requirements of the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in Paragraph 13.2 or has been damaged prior to approval of final payment) as provided in Paragraph 13.7, whether or not the Work is fabricated, installed or completed.

SHOP DRAWINGS, CHANGE ORDERS AND PAYMENTS:

9.5 In connection with Engineer's responsibility for Shop Drawings and samples, see Paragraphs 6.23 through 6.28 inclusive.

9.6 In connection with Engineer's responsibility for Change Orders, see Articles 10, 11 and 12.

9.7 In connection with Engineer's responsibilities in respect of Applications for Payment, etc., see Article 14.

RESIDENT PROJECT REPRESENTATIVES:

9.8 If Owner and Engineer agree, Engineer will furnish a Resident Project Representative and assistants to assist Engineer in carrying out his responsibilities at the site. The duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants shall be as set forth in an exhibit to be incorporated in the Contract Documents, (see Exhibit A to the Supplemental Conditions).

DECISIONS ON DISAGREEMENTS:

9.9 Engineer will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder. In his capacity as interpreter and judge he will exercise his best efforts to insure faithful performance by both Owner and Contractor. He will not show partiality to either and will not be liable for the result of any interpretation or decision rendered in good faith. Claims, disputes and other matters relating to the execution and progress of the Work or the interpretation of or performance under the Contract Documents shall be referred to Engineer for decision; which he will render in writing within a reasonable time. Such decisions shall be binding on the Owner and Contractor.

9.10 NOT USED

LIMITATIONS ON ENGINEER'S RESPONSIBILITIES:

9.11 Neither Engineer's authority to act under this Article 9 or elsewhere in the Contract Documents nor any decision made by him in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of Engineer to Contractor, any Subcontractor, any materialman, fabricator, supplier or any of their agents or employees or any other person performing any of the work.

9.12 Engineer will not be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and he will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.13 Engineer will not be responsible for the acts or omissions of Contractor, or any Subcontractors, or any of his or their agents or employees, or any other persons at the site or otherwise performing any of the Work.

ARTICLE 10--CHANGES IN THE WORK

10.1 Without invalidating the Agreement, Owner may, at his discretion, order additions, deletions or revisions in the Work; these will be authorized by Change Orders. Upon receipt of a Change Order, Contractor shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order

causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in Article 11 or Article 12 on the basis of a claim made by either party.

10.2 Engineer may authorize minor changes or alterations in the Work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. If Contractor believes that any minor change or alteration authorized by Engineer entitles him to an increase in the Contract Price, he may only make a claim therefore as provided in Article 11.

10.3 Additional Work performed by Contractor without authorization of a Change Order will not entitle him to an increase in the Contract Price or an extension of the Contract Time, except in the case of an emergency as provided in Paragraph 6.22 and except as provided in Paragraph 10.2 and 13.7

10.4 Owner shall execute appropriate Change Orders prepared by Engineer covering changes in the work to be performed as provided in Paragraph 4.3, and work performed to an emergency as provided in Paragraph 6.22 and any other claim of Contractor for a change in the Contract Price which is approved by Engineer.

10.5 It is the Contractor's responsibility to notify his Surety of any changes affecting the general scope of the Work or change in the Contract Price and the amount of the applicable Bonds shall be adjusted accordingly.

ARTICLE 11--CHANGE OF CONTRACT PRICE

11.1 The Contract Price constitutes the total compensation payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at this expense without change in the Contract Price.

11.2 The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered to Owner and Engineer within fifteen days of the occurrences to the event giving rise to the claim. Notice of the amount of the claim with supporting data shall be delivered within forty-five days of such occurrences unless Engineer allows an additional period of time to ascertain accurate cost data. All claims for adjustments in the Contract Price shall be determined by Engineer if Owner and Contractor cannot otherwise agree on the amount involved. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

11.3 The value of any Work covered by a Change Order or any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved.

11.3.2 By mutual acceptance of a lump sum.

11.3.3 On the basis of the Cost of the Work (determined as provided in Paragraphs 11.4 and 11.5) plus a Contractor's Fee for overhead and profit (determined as provided in Paragraph 11.6).

COST OF THE WORK:

11.4 The term Cost of the Work means the sum of all costs necessarily incurred and paid by the Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in Paragraph 11.5:

11.4.1 Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing work after regular working hours (8-hour days, Monday through Friday), on Sunday or legal holidays shall be included in the above to the extent authorized by Owner.

11.4.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and manufacturers, field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

11.4.3 Payments made by Contractor to the Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from Subcontractors acceptable to him and shall deliver such bids to Owner who will then determine with the advice of Engineer, which bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of Work Plus a Fee, the Cost of the Work shall be determined in accordance with Paragraphs 11.4 and 11.5. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4 Costs of special consultants (including, but not limited to, engineers, architects, testing laboratories, surveyors, lawyers and accountants) employed for services specifically related to the Work.

11.4.5 Supplemental costs including the following:

11.4.5.1 The proportion of necessary transportation, traveling and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

11.4.5.2 Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workmen, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of Contractor.

11.4.5.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with

rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4 Sales, use or similar taxes related to the Work, and for which Contractor is liable, imposed by any governmental authority.

11.4.5.5 Deposits lost for causes other than Contractor's negligence, royalty payments and fees for permits and licenses.

11.4.5.6 Losses, damages and expenses, not compensated by insurance or otherwise, sustained by Contractor in connection with the execution of, and to, the Work, provided they have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's Fee. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, he shall be paid for his services a fee proportionate to that stated in Paragraph 11.6.2.

11.4.5.7 The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9 Cost of premiums for bonds and insurance which Owner is required to pay in accordance with Paragraph 5.12.

11.5 The term Cost of the Work shall not include any of the following:

11.5.1 Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agent, expediters, timekeepers, clerks, and other personnel employed by Contractor whether at the site or in his principal or a branch office for general administration of the work and not specifically included in the schedule referred to in Subparagraph 11.4.1--all of which are to be considered administrative costs covered by the Contractor's Fee.

11.5.2 Expenses of Contractor's principal and branch offices other than his office at the site.

11.5.3 Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the work and charges against Contractor for delinquent payments.

11.5.4 Cost of premiums for all bonds and for all insurance policies whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except as otherwise provided in Subparagraph 11.4.5.9).

11.5.5 Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.

11.5.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 11.4.

CONTRACTOR'S FEE:

11.6 The Contractor's Fee which shall be allowed to Contractor for his overhead and profit shall be determined as follows:

11.6.1 a mutually acceptable fixed fee; or if none can be agreed upon,

11.6.2 a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1 for costs incurred Under Paragraphs 11.4.1 and 11.4.2, the Contractor's Fee shall be ten percent,

11.6.2.2 for costs incurred under Paragraph 11.4.3, the Contractor's Fee shall be five percent; and if a subcontract is on the basis of Cost of the Work

11.6.2.3 no fee shall be payable on the basis of costs itemized under Paragraphs 11.4.4, 11.4.5 and 11.5.

11.7 The amount of credit to be allowed by Contractor to Owner for any such change which results in a net decrease in cost, will be the amount of the actual net decrease. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase, if any.

11.8 Whenever the cost of any Work is to be determined pursuant to Paragraphs 11.4 and 11.5, Contractor will submit in a form prescribed by Engineer an itemized cost breakdown together with supporting data.

CASH ALLOWANCES:

11.9 It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such materialmen, suppliers or Subcontractors and for such sums within the limit of the allowances as Engineer may approve. Upon final payment, the Contract Price shall be adjusted as required and an appropriate Change Order issued. Contractor agrees that the original Contract Price includes such sums as he deems proper for costs and profit on account of cash allowances. No demand for additional cost or profit in connection therewith will be allowed.

ARTICLE 12 - CHANGE OF THE CONTRACT TIME

12.1 The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to Owner and Engineer within fifteen (15) days of the occurrence of the event giving rise to the claim. Notice of the extent of the claim with supporting data shall be delivered within forty-five (45) days of such

occurrence unless Engineer allows an additional period of time to ascertain more accurate data. All claims for adjustment in the Contract Time shall be determined by Engineer if Owner and Contractor cannot otherwise agree. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.

12.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if he makes a claim therefore as provided in Paragraph 12.1. Such delays shall include, but not be restricted to, acts or neglect by any separate contractor employed by Owner, fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God.

12.3 All the time limits stated in the Contract Documents are of the essence for the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party.

A**RTICLE 13 - WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTIONS, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

WARRANTY AND GUARANTEE:

13.1 Contractor warrants and guarantees to Owner and Engineer that all materials and equipment will be new unless otherwise specified and that all work will be of good quality and free from faults or defects and in accordance with the requirements of the Contract Documents and of any inspections, tests or approvals referred to in Paragraph 13.2. All unsatisfactory Work, all faulty or defective Work, and all Work not conforming to the requirements of the Contract Documents at the time of acceptance thereof or of such inspections, tests or approvals, shall be considered defective. Prompt notice of all defects shall be given to Contractor. All defective Work whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

TESTS AND INSPECTIONS:

13.2 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested, or approved by some public body, Contractor shall assume full responsibility therefore, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval. All other inspections, tests and approvals required by the Contract Documents shall be performed by organizations acceptable to Owner and Contractor and the cost thereof shall be borne by Contractor unless otherwise specified.

13.3 Contractor shall give Engineer timely notice of readiness of the work for all inspections, tests or approvals. If any such Work required so to be inspected, tested or approved is covered without approval of Engineer, it must, if requested by Engineer, be uncovered for observation, and such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of his intention to cover such Work and Engineer has not acted with reasonable promptness in response to such notice.

13.4 Neither observations by Engineer nor inspections, tests or approvals by persons other than Contractor shall relieve Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.

13.5 Engineer and his representatives and other representatives of Owner will at reasonable times have access to the Work. Contractor shall provide proper and safe facilities for such access and observation of the Work and also for any inspection or testing thereof by others.

UNCOVERING WORK:

13.6 If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for his observation and replaced at Contractor's expense.

13.7 If any work has been covered which Engineer has not specifically requested to observe prior to its being covered, or if Engineer considers it necessary or advisable that covered work be inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract price and/or extension of the Contract Time, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction if he makes a claim therefore as provided in Articles 11 and 12.

OWNER MAY STOP THE WORK:

13.8 If the Work is defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, or if Contractor fails to make prompt payments to Subcontractors or for labor, materials or equipment, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any other party.

CORRECTION OR REMOVAL OF DEFECTIVE WORK:

13.9 If required by Engineer prior to approval of final payment, Contractor shall promptly, without cost to Owner and as specified by Engineer, either correct any defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Engineer, remove it from the site and replace it with acceptable Work. If Contractor does not correct such defective Work or remove and replace such rejected Work within a reasonable time, all as specified in a written notice from Engineer, Owner may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement, including compensation for additional professional services, shall be paid by Contractor, and an appropriate deductive Change Order shall be issued. Contractor shall also bear the expenses of making good all Work of others destroyed or damaged by his correction, removal or replacement of his defective Work.

ONE-YEAR CORRECTION PERIOD:

13.10 If, after the approval of final payment and prior to the expiration of one year after the date of Substantial completion or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contractor Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or, if it has been rejected by Owner, remove it from the site and replace it with acceptable Work. If

Contractor does not promptly comply with the terms of such instructions, Owner may have the defective Work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be paid by Contractor.

ACCEPTANCE OF DEFECTIVE WORK:

13.11 If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to approval of final payment, also Engineer) prefers to accept it, he may do so. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price; or, if the acceptance occurs after approval of final payment, an appropriate amount shall be paid by Contractor to Owner.

NEGLECTED WORK BY CONTRACTOR:

13.12 If Contractor should fail to prosecute the Work in accordance with the Contract Documents, including any requirements of the progress schedule, Owner, after seven days written notice to Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and the cost thereof (including compensation for additional professional services) shall be charged against Contractor if Engineer approves such action, in which case a Change Order shall be issued incorporating the necessary revisions in the Contract Documents including an appropriate reduction in the Contract Price. If the payments then or thereafter due Contractor are not sufficient to cover such amount, Contractor shall pay the difference to Owner.

ARTICLE 14--PAYMENTS AND COMPLETION

SCHEDULES:

14.1 At least ten (10) days prior to submitting the first Application for a progress payment, Contractor shall submit a progress schedule, a final schedule of Shop Drawings submission and schedule of values of the Work. These schedules shall be satisfactory in form and substance to Engineer. The schedule of values shall include quantities and unit prices aggregating the Contractor Price, and shall subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon approval of the schedules of values by Engineer, it shall be incorporated into the form of Application for Payment furnished by Engineer.

APPLICATION FOR PROGRESS PAYMENT:

14.2 At least ten (10) days before each progress payment falls due (but not more than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such data and schedules as Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such data, satisfactory to Owner, as will establish Owner's title to the material and equipment and protect his interest therein, including applicable insurance. Each subsequent Application for Payment shall include an affidavit of Contractor stating that all previous progress payments received on account of the

work have been applied to discharge in full all of Contractor's obligations reflected in prior Applications for Payment.

CONTRACTOR'S WARRANTY OF TITLE:

14.3 Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens").

APPROVAL OF PAYMENTS:

14.4 Engineer will, within ten (10) days after receipt of each Application for Payment, either indicate in writing his approval of payment and present the Application to Owner, or return the Application to Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, Contractor may make the necessary corrections and re-submit the Application. Owner shall, within thirty (30) days of presentation to him of an approved Application for Payment, pay Contractor the amount approved by Engineer.

14.5 Engineer's approval of any payment requested in an Application for Payment will constitute a representation by him to Owner, based on Engineer's on-site observations of the Work in progress as an experienced and qualified design professional and on his review of the Application for Payment and the accompanying data and schedules that the work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning Project upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents and any qualifications stated in his approval); and that Contractor is entitled to payment of the amount approved. However, by approving any such payment Engineer will not thereby be deemed to have represented that he made exhaustive or continuous on-site inspections to check the quality or the quantity of the Work, or that he has reviewed the means, methods, techniques, sequences, and procedures of construction, or that he has made any examination to ascertain how or for what purpose Contractor has used the monies paid to him on account of the Contract Price, or that title to any work, materials or equipment has passed to Owner free and clear of any Liens.

14.6 Engineer's approval of final payment will constitute an additional representation by him, to Owner that the conditions precedent to Contractor's being entitled to final payment as set forth in Paragraph 14.13 have been fulfilled.

14.7 Engineer may refuse to approve the whole or any part of any payment if, in his opinion, it would be incorrect to make such representations to Owner. He may also refuse to approve any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously approved, to such extent-- as may be necessary in his opinion to protect Owner from loss because:

14.7.1 the Work is defective, or completed Work has been damaged requiring correction or replacement,

14.7.2 claims or Liens have been filed or there is reasonable cause to believe such may be filed,

14.7.3 the Contract Price has been reduced because of Modifications,

14.7.4 Owner has been required to correct defective Work or complete the Work in accordance with Paragraph 13.9, or

14.7.5 of unsatisfactory prosecution of the Work, including failure to furnish acceptable submittals or to clean up.

SUBSTANTIAL COMPLETION:

14.8 Prior to final payment, Contractor may, in writing to Owner and Engineer, certify that the entire Project is substantially complete and request that Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of the Project to determine the status of completion. If Engineer does not consider the Project substantially complete, he will notify Contractor in writing giving his reasons therefore. If Engineer considers the Project substantially complete, he will prepare and deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion and the responsibilities between Owner and Contractor for maintenance and utilities. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment, and the certificate shall fix the time within which such items shall be completed or corrected, said time to be within the Contract Time.

Owner shall have seven days after receipt of the tentative certificate during which he may make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Project is not substantially complete, he will within fourteen (14) days after submission of the tentative certificate to Owner notify Contractor in writing, stating his reasons therefore. If, after consideration of Owner's objections, Engineer considers the Project substantially complete, he will within said fourteen (14) days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as he believes justified after consideration of any objections from Owner.

14.9 Owner shall have the right to exclude Contractor from the Project after date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

PARTIAL UTILIZATION:

14.10 Prior to final payment, Owner may request Contractor in writing to permit him to use a specified part of the Project which he believes he may use without significant interference with the construction of the other parts of the Project. If Contractor agrees, he will certify to Owner and Engineer that said part of the Project is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Project to determine its status of completion. If Engineer does not consider that it is substantially complete, he will notify Owner and Contractor in writing giving his reasons therefore. If Engineer considers that part of the Project to be substantially complete, he will execute and deliver to Owner and Contractor a certificate to that effect, fixing the date of Substantial Completion as to that part of the Project, attaching thereto a tentative list of items to be completed or corrected before final payment and fixing the responsibility between Owner and Contractor for maintenance, heat and utilities as to that part of the Project. Owner shall have the right to exclude Contractor from any part of the Project which Engineer has so certified to be substantially complete, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

FINAL INSPECTION:

14.11 Upon written notice from Contractor that the Project is complete, Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars for which this inspection reveals that the work is incomplete or defective. Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

FINAL APPLICATION FOR PAYMENT:

14.12 After Contractor has completed all such corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection and other documents--all as required by the Contract Documents, he may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by such data and schedules as Engineer may reasonably require, together with complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of the Contract Documents and the labor and services performed and the material and equipment furnished thereunder. In lieu thereof and as approved by Owner, Contractor may furnish receipts or releases in full; an affidavit of Contractor that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or his property might in any way be responsible, have been paid or otherwise satisfied; and consent of the Surety, if any, to final payment. If any Subcontractor material man, fabricator or supplier fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify him against any Lien.

APPROVAL OF FINAL PAYMENT:

14.13 If, on the basis of his observation and review of the Work during construction, his final inspection and his review of the final Application for Payment--all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor has fulfilled all of his obligations under the Contract Documents, he will, within ten (10) days after receipt of the final Application for Payment, indicate in writing his approval of payment and present the Application to Owner for payment. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.16. Otherwise, he will return the Application to Contractor, indicating in writing his reasons for refusing to approve final payment, in which case Contractor shall make the necessary corrections and re-submit the Application. Owner shall, within thirty (30) days of presentation to him of an approved final Application for Payment, pay Contractor the amount approved by Engineer. Monies in retainage shall be requested as above after the lien period.

14.14 If after Substantial Completion of the work, final completion thereof is materially delayed through no fault of Contractor, and Engineer so confirms, Owner shall, upon certification of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully complete or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in Paragraph 5.1, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Engineer prior to certification of such payments. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

CONTRACTOR'S CONTINUING OBLIGATION:

14.15 Contractor's obligation to perform the work and complete the Project in accordance with the Contract Documents shall be absolute. Neither approval of any progress or final payment by Engineer, nor the issuance of a certificate of Substantial Completion, nor any payment by Owner to Contractor under the Contract Documents, nor any use or occupancy of the Project or any failure to do so, nor any correction of defective work by Owner shall constitute an acceptance of Work not in accordance with the Contract documents.

WAIVER OF CLAIMS:

14.16 The making and acceptance of final payment shall constitute:

14.16.1 a waiver of all claims by Owner against Contractor other than those arising from unsettled Liens, defective work appearing after final inspection pursuant to Paragraph 14.11, or from failure to comply with the requirements of the Contract Documents or the terms of any special guarantees specified therein, and

14.16.2 a waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

MAINTENANCE BONDS:

14.17 NOT USED

ARTICLE 15--SUSPENSION OF WORK AND TERMINATION

OWNER MAY SUSPEND WORK:

15.1 Owner may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by notice in writing to Contractor and Engineer which shall fix the date on which Work shall be resumed. Contractor shall resume the Work on the date so fixed. Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if he makes a claim therefore as provided in Articles 11 and 12.

OWNER MAY TERMINATE:

15.2 If Contractor is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act, or to re-organize under the bankruptcy or similar laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to Subcontractors or for labor, or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction, or if he disregards the authority of Engineer, or if he otherwise violates any provision of the Contract Documents, then Owner may, without prejudice to any other right or remedy and after giving Contractor and his Surety seven days, written notice, terminate the services of Contractor and take possession of the Project and of all materials, equipment, tools, construction equipment and

machinery thereon owned by Contractor, and finish the Work by whatever method he may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to Contractor. If such costs exceed such unpaid balance, Contractor shall pay the difference to Owner. Such costs incurred by Owner shall be determined by Engineer and incorporated in a Change Order.

15.3 Where Contractor's services have been so terminated by Owner, said terminations shall not affect any right of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of monies by Owner due Contractor will not release Contractor from liability.

15.4 Upon seven (7) days written notice to Contractor and engineer, Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Agreement. In such cases, Contractor shall be paid for all Work executed and any expense sustained plus a reasonable profit.

CONTRACTOR MAY STOP WORK OR TERMINATE:

15.5 If through no act or fault of Contractor, the Work is suspended for a period of more than ninety (90) days by Owner or under an order of court or other public authority, or Engineer fails to act on any Application for Payment within thirty (30) days after it is submitted, or Owner fails to pay Contractor any sum approved by Engineer within thirty (30) days of its approval and presentation, then Contractor may, upon seven (7) days written notice to Owner and Engineer, terminate the Agreement and recover from Owner payment for all Work executed and any expense sustained plus a reasonable profit. In addition to and in lieu of terminating the Agreement, if Engineer has failed to act on an Application for payment or Owner has failed to make any payment as aforesaid, Contractor may upon seven (7) days notice to Owner and Engineer stop the Work until he has been paid all amounts then due.

ARTICLE 16--ARBITRATION

16.1 Arbitration shall not be an acceptable method of settlement for any claim, dispute, discrepancy, deficiency, or other matter associated directly or indirectly with the work, unless specifically agreed to in writing by all parties associated with the Work.

ARTICLE 17--MISCELLANEOUS

GIVING NOTICE:

17.1 Whenever any provision of the Contract Documents requires the giving of written notice, it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to him who gives the notice.

COMPUTATION OF TIME:

17.2 When any period of time is referred to in the Contract Documents by days, it shall be commuted to include the first and the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

GENERAL:

17.3 All monies not paid when due hereunder shall bear interest at the maximum rate allowed by law at the place of the project.

17.4 All Specifications, Drawings, and copies thereof furnished by Engineer shall remain his property. They shall not be used on another Project. With the exception of those sets which have been signed in connection with the execution of the Agreement, all documents shall be returned to him on request upon completion of the Project. The Contract Documents shall not be re-used or copied without the express written consent of the Engineer of record.

17.5 The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder, and, in particular but without limitations, the warranties, guarantees and obligations imposed upon Contractor by Paragraphs 6.30, 13.1, 13.10, and 14.3 and the rights and remedies available to Owner, and Engineer thereunder, shall be in addition to, and shall not be construed in any way as a limitation of, any rights and remedies available to them which are otherwise imposed or available by law, by special guarantee or by other provisions of the Contract Documents.

17.6 Should Owner or Contractor suffer injury or damage to his person or property because of any error, omission or act of the other or of any of his employees or agents or others for whose acts he is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

17.7 The Contract Documents shall be governed by the law of the place of the Project.

ARTICLE 18--TIME FOR COMPLETION AND LIQUIDATED DAMAGES

18.1 The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the Work embraced shall be commenced on a date specified in the Notice To Proceed and completed within the time specified in the Contract Documents.

18.2 The Contractor will proceed with the work at such rate of progress to insure full completion within the Contract Time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract Time for the completion of the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the Work.

18.3 If the Contractor shall fail to complete the Work within the Contract Time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount for liquidated damages as specified in the Bid for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.

18.4 The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is due to the following, and the Contractor has promptly given Written Notice of such delay to the Owner or Engineer.

18.4.1 To any preference, priority or allocation order duly issued by the Owner.

18.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy,

acts of the Owner, acts of another Contractor, and abnormal and unforeseeable weather.

ARTICLE 19--SUPPLEMENTARY CONDITION

GENERAL:

19.1 The sections of these Contract Documents entitled "Information for Bidders" and "Standard General Conditions" of these Contract Documents are amended, supplemented and modified as follows:

INFORMATION FOR BIDDERS

SUBMISSION OF BIDS

On any bid in excess of $50,000, the bidder must certify that he is a licensed contractor in the State of Louisiana for the type of work upon which he is bidding. The bidder must show his Louisiana Contract License Number on the bid and on the face of the bid envelope. Any bid not in compliance with the above requirements shall be subject to automatic rejection. Also, the Contractor is notified that he shall be required to acquire any and all necessary licenses for work within the incorporated limits of the City of Slidell, Louisiana.

19.2 Report to Bonding Company

The Owner reserves the right to submit to the Bonding Agent of the Contractor at any time a report of the Contractor's progress on the project. The Contractor, upon written request, may receive copies of any report sent.

STANDARD GENERAL CONDITIONS

ARTICLE 1--DEFINITIONS

Wherever used in these specifications, the following words and terms shall have the meanings indicated.

CREW: The number of persons required for the performance of work at a site as determined by the Contractor in response to task difficulty and safety considerations at the time or location of the work.

EASEMENT: A liberty, privilege, or advantage without profit which the Owner of one parcel of land may have in the land of another. In this agreement, all land, other than public streets, in which the Owner has sewer system lines or installations and right of access to such lines or installations.

EASEMENT ACCESS: Areas within an easement to which access is required for performance of work.

ENGINEER: The Engineer is City of Slidell City Engineer.

INVITATION TO BID: The advertisement published by the Owner giving notice of a request for bids.

LINEAR FOOT: Being one foot. In these specifications used to denote unit of measurement related to the length of a sewer line.

OWNER: The Owner is the City of Slidell.

SITE: Any location where work has been or will be done.

SITE ACCESS: An adequately clear area of a size sufficient to accommodate personnel and equipment required at the location where work is to be performed, including roadway or surface sufficiently unobstructed to permit conveyance of vehicles from the nearest paved roadway to the work location.

STORM SEWER: A sewer intended to carry only storm waters, surface runoffs, street washwaters, and drainage.

STREET ACCESS: Areas normally used for public vehicular traffic (including roads, streets, or rights-of-way extending twenty feet from either side of the traversing area) to which safe access is required for performance of work.

SUBCONTRACTOR: An individual, firm, or corporation having a direct contract with the Contractor or with a lower-tier Subcontractor for performance of part of the work.

SWALE (DIP, SAG): A significant deviation in pipe grade such as to cause entrapment of solids, semisolids, and liquids, thereby impeding the accuracy and/or effectiveness of flow measurements, cleaning, and internal-inspection.

INITIALS

ASTM	American Society for Testing Materials
ACI	American Concrete Institute
AASHTO	American Association of State Highway and Transportation Officials
AWWA	American Water Works Association

PERFORMANCE BOND: The approved form of security furnished by the Contractor and his Surety as a guarantee of the proper performance of the work and payment for all materials or other obligations contracted by him in the prosecution thereof.

SURETY: The corporate body, licensed to do business in the State where the work is located, which is bound with and for the Contractor, and which is primarily liable and responsible for the payment of all obligations pertaining to and for the acceptable performance of the work required by the Contractor.

TESTING LABORATORY: Any testing laboratory designated or approved by the Engineer to perform tests of materials entering the work.

PAYMENT FOR WORK: Payment for the items shown in Schedule of Bid Prices shall include all incidental items necessary to complete the work.

ARTICLE 2 - PRE-CONSTRUCTION PROVISIONS

2.1 Add the following:

One set of the Executed Contract Documents shall be filed by the Owner at the expense of the Contractor. Once the actual costs for recording the contract are known, the Slidell City Attorney will contact the Contractor to request a check be prepared and sent to the City Attorney for these costs. The City Attorney will then have the Contact recorded with the Clerk of Court or the Recorder of Mortgages in St. Tammany Parish.

2.8 Add the following:

This provision may be waived by the Owner or Engineer.

2.9 Add - "The Owner may elect to dispense with this conference."

ARTICLE 5 - PERFORMANCE, PAYMENT AND OTHER BONDS

5.1 Amend to include the following:

The Contractor's bondsman shall obligate himself to all the terms and covenants of these specifications and of contracts covering the work executed hereunder. The Owner reserves the right to order extra work or make changes by altering, adding to or deducting from the work under the conditions and in the manner herein described without notice to the Contractor's surety and without in any manner affecting the liability of bondsman or releasing him from any of his obligations hereunder. The bond shall also secure for the Owner the faithful performance of the contract in strict accordance with plans and specifications. It shall protect the Owner against all lien laws of the State and shall provide for payment of reasonable attorney's fees for enforcement of contract and institution of concursus proceedings, if such proceedings become necessary. Likewise, it shall provide that if the Engineer is put to labor or expense by enforcement of contract and institution of concursus proceedings or through delinquency or insolvency of the contract, they shall be equitably paid for such extra expense and services involved.

The surety of the Contractor shall be and does hereby declare and acknowledge himself by acceptance to be bound to the Owner as guarantor, jointly and in solido with the Contractor, for fulfillment of terms of the foregoing conditions.

CONTRACTOR'S LIABILITY INSURANCE

5.3 Add the following:

The limits of liability coverage shall not be less than the following:

Bodily injury liability of $1,000,000 per person and $1,000,000 per accident. Property damage liability of $1,000,000 per accident.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

LABOR, MATERIALS AND EQUIPMENT

6.5 Amend to include the following: If materials are brought on the work site which do not conform to the Specifications, the Engineer shall order the same to be removed forthwith, and in case of the neglect or refusal of the Contractor or those employed by him to remove such materials, to cause the same to be removed at the expense of the Contractor and to

deduct the cost of such removal and all other expenses incidental thereto from the amount which may be due or may become due the Contractor.

ARTICLE 14 - PAYMENTS AND COMPLETION

14.2 Shall be amended to include:

A retainage of 10% (ten percent) shall be withheld from each progress payment to satisfy lien claims unless the contract amount is greater than $500,000, at which the retainage shall be 5% (five percent).

14.8 Shall be amended to include:

Upon substantial completion of the Construction or Work, the Contractor at the discretion of the Engineer shall file the Engineer's Certificate of Substantial Completion with the Clerk of Courts or Recorder of Mortgages where the Contract Documents were recorded. At the expiration of 45 days, if no claims have been recorded, the Contractor shall obtain and submit to the Engineer a lien privilege certificate along with his final application for payment. Substantial completion shall be generally defined at such time as the Owner may occupy or use the Work for its intended function.

ARTICLE 17 MISCELLANEOUS

Paragraphs 17.8 and 17.9 shall be added as follows:

PROJECT SIGNS:

17.8 Project signs shall be provided by the Contractor as required in the technical specifications. Any required signs shall be furnished and erected to Engineer's approval prior to any work being performed on the project. No payments shall be made if this requirement is not met. This is not a pay item.

VIDEO TAPING:

17.9 The project area shall be videoed by the Contractor before and after the construction of the Work. This shall be copied onto a CD in a widely acceptable, readable format. The tape or copy thereof shall be provided for Owner's records.

17.10 The OWNER and the CONTRACTOR agree that in the event either party institutes legal action against the other under the contract, the claimant in such legal action shall pay to the other party a portion of the defense costs, including investigations, engineering fees, attorney's fees, expert witnesses, fees, court costs and any other expenses of defense which may be incurred by such other party. Such portion of the defense costs shall bear the same ratio to the total defense costs incurred by the other party as the dollar amount of the claimant's monetary demands which were not sustained by the court bears to the total dollar amount of the claimant's monetary demands. The party or parties whose claims were not sustained in whole or in part shall pay such portion of the defense costs to the other party or parties as part of the court's assessment of costs within 30 days after final determination of the claims and after being furnished by the other party or parties with an itemized listing of the total defense costs incurred.

EXHIBIT A

DUTIES, RESPONSIBILITIES AND LIMITATIONS OF AUTHORITY OF RESIDENT PROJECT REPRESENTATIVE

A. General

The Resident Project Representative is the Engineer's Agent, and will act as directed by and under the supervision of Engineer, and will confer with the Engineer regarding his actions. The Resident Project Representative's dealings in matters pertaining to the on-site Work shall in general be only with the Engineer and the Contractor, and dealings with subcontractors shall only be through or with the full knowledge of the Contractor. Written communications with the Owner will be only through or as directed by the Engineer.

B. Duties and Responsibilities

Resident Project Representative will:

1. Schedules: Review the progress schedule, schedule of Shop Drawing submissions and schedule of values prepared by Contractor and consult with Engineer concerning their acceptability.

2. Conferences: Attend pre-construction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with Engineer and notify those expected to attend in advance. Attend meetings, and maintain and circulate copies of minutes thereof.

3. Liaison:

    a. Serve as the Engineer's liaison with the Contractor, working principally through the Contractor's superintendent and assist him in understanding the intent of the Contract Documents. Assist the Engineer in serving as the Owner's liaison with the Contractor when the Contractor's operations affect the Owner's on-site operations.

    b. As requested by the Engineer, assist in obtaining from the Owner additional details or information, when required at the job site for proper execution of the Work.

4. Shop Drawings and Samples

    a. Receive and record date of receipt of Shop Drawings and samples, receive samples which are furnished at the site by Contractor, and notify Engineer of their availability for examination.

    b. Advise Engineer and Contractor or his superintendent immediately of the commencement of any Work requiring a Shop Drawing or sample submission if the submission has not been approved by Engineer.

5. Review of Work, Rejection of Defective Work, Inspections and Tests

    a. Conduct on-site observations of the work in progress to assist Engineer in determining if the Work is proceeding in accordance with the Contract Documents and that completed Work will conform to the Contract Documents.

b. Report to Engineer whenever he believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or does not meet the requirements of any inspections, tests or approvals required to be made, or has been damaged prior to final payment; and advise Engineer when he believes Work should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

c. Verify that tests, equipment and systems startups and operating and maintenance instructions are conducted as required by the Contract Documents and in presence of the required personnel, and that Contractor maintains adequate records thereof; observe, record and report to Engineer appropriate details relative to the test procedures and startups.

d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to Engineer.

6. Interpretation of Contract Documents: Transmit to Contractor the Engineer's clarifications and interpretations of the Contract Documents.

7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report them with recommendations to Engineer.

8. Records

a. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and samples submissions, reproductions of original Contract Documents including all addenda, change orders, field orders, additional Drawings issued subsequent to the execution of the Contract, Engineer's clarifications and interpretations of the Contract Documents, progress, reports, and other Project related documents.

b. Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions, list of visiting officials and representatives of manufacturers, fabricators, suppliers and distributors, daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send copies to Engineer.

c. Record names, addresses and telephone numbers of all Contractors, sub-contractors and major suppliers of materials and equipment.

9. Reports

a. Furnish Engineer periodic reports as required of progress of the Work and Contractor's compliance with the approved progress schedule of Shop Drawing submissions.

b. Consult with Engineer in advance of scheduled major tests, inspections or start of important phases of the work.

c. Report immediately to Engineer upon the occurrence of any accident.

10. Payment Requisitions: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to Engineer, noting particularly their relation to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

11. Certificates, Maintenance and operation Manuals: During the course of the Work verify that certificates, maintenance and operation manuals, and other data required to be assembled and furnished by Contractor are applicable to the items actually installed; and deliver this material to Engineer for his review and forwarding to Owner prior to final acceptance of the Work.

12. Completion

    a. Conduct final inspection in the company of Engineer, Owner and Contractor and prepare a final list of items to be completed or corrected.

    b. Before Engineer issues a Certificate of Completion, submit to Contractor a list of observed items requiring completion or correction.

    c. Verify that all items on final list have been completed or corrected and make recommendations to Engineer concerning acceptance.

13. Limitations of Authority

    Except upon written instructions of Engineer, Resident Project Representative:

    a. Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment.

    b. Shall not exceed limitations on Engineer's authority as set forth in the contract Documents.

    c. Shall not undertake any of the responsibilities of Contractor, subcontractors or Contractor's superintendent, or expedite the Work.

    d. Shall not advise or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

    e. Shall not advise or issue directions as to safety precautions and programs in connection with the Work.

    f. Shall not authorize Owner to occupy the Project in whole or in part.

    g. Shall not participate in specialized field or laboratory tests.

SECTION 008000 – PROJECT DIRECTORY

PROJECT DIRECTORY

OWNER

CITY OF SLIDELL
P.O. BOX 828
SLIDELL, LA 70459

ARCHITECT

PEREZ APC
317 BURGUNDY STREET, SUITE 10
NEW ORLEANS, LA. 70112

PHONE: (504) 588-2161
FAX: (504) 588-2162
CONTACT: RODNEY A. DIONISIO

CIVIL ENGINEER

KREBS, LASALLE, LEMIEUX CONSULTANTS, INC.
1580 W. CAUSEWAY APPROACH, SUITE 1
MANDEVILLE, LA , 70471

PHONE: (985) 624-5125
FAX: (985) 624-8245
CONTACT: PAUL ANDERSON

STRUCTURAL

MORPHY MAKOFSKY
336 N. JEFF DAVIS PKWY
NEW ORLEANS, LA 70119

PHONE: (504) 488-1317
FAX: (504) 488-0924
CONTACT: DON MAKOFSKY

MECHANICAL AND PLUMBING

THOMPSON LUKE & ASSOCIATES LLC
CONSULTING ENGINEERS
2532 TOULON DRIVE
BATON ROUGE, LA 70816

PHONE: (225) 293-9474
FAX: (225) 293-4171
CONTACT: FRANK S. THOMPSON, PE

ELECTRICAL

CRAIG HEBERT ENGINEERING INCORPORATED
114 TOLEDO DRIVE
LAFAYETTE, LA 70506

PHONE: (337) 237-5396
CONTACT: CRAIG HEBERT

END OF SECTION 008000

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Purchase contracts.
4. Owner-furnished products.
5. Contractor-furnished, Owner-installed products.
6. Access to site.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and drawing conventions.

B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification:

Slidell Senior Citizen Center

B. Project Location:
610 Cousin Street
Slidell, LA 70458

C. Owner: City of Slidell, Louisiana

Owner's Representative:
Donna O'Dell
City of Slidell
1330 Bayou Lane
Slidell, LA 70458

D. Architect:

Perez, A Professional Corporation
317 Burgundy Street, Suite 10
New Orleans, Louisiana 70112
Telephone: 504.588.2161
Facsimile: 504.588.2162

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. Base Bid: This project consists of furnishing all supervision, labor, equipment, and materials necessary for the construction of new raised one story steel framed structure with Portland cement stucco and full demolition and removal of an existing structure at 610 Cousin Street. Site work includes modifications to existing parking lot, addition of supplementary parking areas to meet code upgrades, rough and finish grading, relocation of utilities as required, modification to curbs as required, and relocation of dumpster with new enclosure. The project will include a new concrete pile foundation and structural slab, steel columns, beams, bar joists, and trusses, Portland cement stucco with metal stud walls, standing seam metal roof on insulation and metal deck, storefront systems, fixed and sliding windows, metal-framed interior partitions, doors and frames with hardware, millwork, automatic sprinkler system and complete mechanical, electrical and plumbing systems. The project shall also include construction of an attached steel framed canopy with a standing seam metal roof on insulation and metal deck.

B. Type of Contract

1. Project will be constructed under a single prime contract.

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 ACCESS TO SITE

A. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. The owner shall designate areas used for storage of materials, trailers and/or any other equipment that the contractor needs on site.

1. Limits: Confine construction operations to areas where work is permitted.

2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to working hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, except as otherwise indicated.
1. Early Morning Hours: as approved by Owner.
2. Late Evening Hours: as approved by Owner.
3. Weekend Hours: as approved by Owner.
4. Hours for Utility Shutdowns: as approved by Owner.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect, Construction Manager and Owner not less than two days in advance of proposed utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect, Construction Manager and Owner not less than two days in advance of proposed disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building and on the Project site is not permitted.

G. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.

1. Maintain list of approved screened personnel with Owner's Representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.10 MISCELLANEOUS PROVISIONS (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Installation of an additional fire hydrant per the requirements of the City of Slidell.

1. Base Bid: All work as indicated in Contract Documents, which include Specifications and the Drawing set as a whole, with the exception of the work required to add an additional fire hydrant as described below.
2. Alternate: All work associated with the additional fire hydrant on the site as indicated in the drawings. For installation work will include, but is not limited to, tapping into existing water supplies to connect the hydrant and providing and installing piping and hydrant hardware as required to produce a functional fire hydrant per the requirements and specification of the City of Slidell. The Alternate will also include any and all coordination and permitting with the authorities involved and having jurisdiction.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Division 01 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form:
   Use **CSI Form 1.5C** (During Bidding/Negotiating Stage) see sample provided
   Use **CSI Form 13.1A.** (After Bidding/Negotiating Stage) see sample provided

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **seven** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than **15** days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections:

1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use CSI Form 13.6B "Proposal Worksheet Summary" and 13.6C "Proposal Worksheet Detail".

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use CSI Form 13.6A "Change Order Request (Proposal)" with attachments CSI Form 13.6B "Proposal Worksheet Summary" and 13.6C "Proposal Worksheet Detail".

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit Price Adjustment: Refer to Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:
   1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
   3. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

   1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:

      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect and owner at earliest possible date but no later than (14) fourteen days from notice to proceed.

3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values correlated with each element.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Materials previously stored and included in previous Applications for Payment.
    b. Work completed for this Application utilizing previously stored materials.
    c. Additional materials stored with this Application.
    d. Total materials remaining stored, including materials with this Application.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment, from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Schedule of unit prices.
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project Web site.
6. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections:

1. Division 01 Section "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
3. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
5. Division 01 Section "General Commissioning Requirements" for coordinating the Work with Owner's commissioning authority.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components

within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."

1.6 KEY PERSONNEL

A. Key Personnel Names: Within [**15**] days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone

numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: **Software-generated form with substantially the same content as indicated above, acceptable to Architect**.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow [**seven**] working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within [**10**] days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within **seven** days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log **weekly**. **Software log with not less than the following:**

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: **Schedule and conduct** meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within **three** days of the meeting.

B. Preconstruction Conference: **Architect will schedule and conduct** a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than **15** days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for processing Applications for Payment.
    h. Submittal procedures.
    i. Use of the premises **and existing building**.
    j. Work restrictions.
    k. Working hours.
    l. Owner's occupancy requirements.
    m. Responsibility for temporary facilities and controls.
    n. Construction waste management and recycling.
    o. Parking availability.
    p. Office, work, and storage areas.
    q. Equipment deliveries and priorities.
    r. First aid.
    s. Security.
    t. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Project Closeout Conference: **Schedule and conduct** a Project closeout conference, at a time convenient to Owner and Architect, but no later than [**30**] days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers;

and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for preparing sustainable design documentation.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Coordination of separate contracts.
    k. Owner's partial occupancy requirements.
    l. Installation of Owner's furniture, fixtures, and equipment.
    m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

D. Progress Meetings: **Conduct** progress meetings at **weekly** intervals unless changed by the owner.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: **Conduct** Project coordination meetings at as needed. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's construction schedule.
   2. Daily construction reports.
   3. Material location reports.
   4. Field condition reports.
   5. Special reports.

B. Related Sections:

   1. Division 01 Section "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
   2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
   3. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.

C. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

D. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.
2. Two mailed or delivered paper copies.

B. Start-up construction schedule.

1. Approval of cost-loaded start-up construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Material Location Reports: Submit at weekly intervals.

H. Field Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include not less than [15] <Insert number> days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Submittals.
    b. Installation.
    c. Startup and placement into final use and operation.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed. Base schedule on the start-up construction schedule and additional information received since the start of Project.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Start-up Network Diagram: Submit diagram within [14] <Insert number> days of date established for [commencement of the Work] [the Notice to Proceed] [the Notice of

Award]. Outline significant construction activities for the first [90] <Insert number> days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a[cost- and resource-loaded,] time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than [60] <Insert number> days after date established for [commencement of the Work] [the Notice to Proceed] [the Notice of Award].

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions, including presence of rain or snow.
5. Accidents.
6. Meetings and significant decisions.
7. Unusual events (refer to special reports).
8. Stoppages, delays, shortages, and losses.
9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of authorities having jurisdiction.
12. Change Orders received and implemented.
13. Construction Change Directives received and implemented.
14. Services connected and disconnected.
15. Equipment or system tests and startups.
16. Partial completions and occupancies.
17. Substantial Completions authorized.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At **weekly intervals**, update schedule to reflect actual construction progress and activities. **Issue schedule one week before each regularly scheduled progress meeting.**

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.

C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action, informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled dates for installation.
    i. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No

extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow **15** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow **15** days for review of each resubmittal.

C. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4” x 5” on label or beside title block to record Contractor's review and approval markings and action taken by Architect
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.
    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Other necessary identification.

D. Deviations: Identify deviations from the Contract Documents on submittals.

E. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

F. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will **return submittals, without review** received from sources other than Contractor.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of revision in label or title block and clearly indicate extent of revision.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. **Electronic submittals shall not be permitted.**

2. Action Submittals: Submit **five** paper copies of each submittal, unless otherwise indicated. Architect will return **two** copies.

3. Informational Submittals: Submit **two** paper copies of each submittal, unless otherwise indicated. Architect will not return copies.
4. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

6. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm) .
3. Submit Shop Drawings in the following format:
   a. **Five** opaque copies of each submittal. Architect will retain **two** copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit **three** sets of Samples. Architect will retain **two** Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **three** sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product
a. .

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

L. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

P. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

Q. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

R. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

S. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

V. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

W. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner**,** or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of **five** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.

1. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to **ASTM E 329** and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least **72** hours in advance of time when Work that requires testing or inspecting will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.

5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .

1. Distribution: Distribute schedule to Owner, Architect testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141

ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700

AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)	
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500

AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation) www.internationalbadminton.org	6-03-9283 7155
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263

CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	Canadian Standards Association	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute www.caststone.org	(717) 272-3744
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau	(604) 820-7700

	www.cedarbureau.org	
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FM Global)	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772

FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation (Now BWF)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11

IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc.	(312) 644-6610

	www.metalframingmfg.org	
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-2300

NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.com	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International)	(800) 673-6275 (734) 769-8010

	www.nsf.org	
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. (Now ITS)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) www.landcarenetwork.org	(800) 395-2522 (703) 736-9666
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.redwoodinspection.com	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SDI	Steel Deck Institute	(847) 458-4647

	www.sdi.org	
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331

STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. (Now TCNA)	
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700

WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
UBC	Uniform Building Code (See ICC)	

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration	(800) 321-6742

	www.osha.gov	(202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-2664

	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
	Available from Defense Standardization Program www.dps.dla.mil	
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.wbdg.org/ccb	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations www.calregs.com	(916) 323-6815
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Resource Development http://txforestservice.tamu.edu	(979) 458-6650

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 01 45 29 - TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION:

A. Work Included: Provide testing and inspecting, complete, as described in this Section and elsewhere in the Contract Documents. The Contractor shall select a testing laboratory from list approved by Owner and include cost of all testing in his proposal.

B. Related Work:
1. Requirements for testing may also be described in various Sections of these specifications.
2. Contractor shall be responsible for making arrangements to have laboratory personnel available when tests are required and for obtaining concrete and asphalt mix designs as required.
3. Tests for items of construction work not specified in this section shall be in accordance with the testing requirements of the Louisiana Department of Transportation and Development (L.D.O.T.D.).

1.3 QUALITY ASSURANCE

A. Provide the services of the testing laboratory approved by the Architect.

B. Laboratory to supply only technicians with a minimum of 12 months experience in the type of inspection or testing involved.

C. Technicians supplied by the Laboratory shall have obtained a copy of the plans and specifications and shall be thoroughly aware of their requirements.

D. Upon completion of each test and/or inspection, promptly distribute copies of test or inspection reports to the Architect, Civil Engineer, Structural Engineer, to governmental agencies requiring submission of such reports, and to such other persons as directed by the Architect or Engineer.

1.4 COOPERATION OF THE CONTRACTOR

A. The Contractor shall cooperate with the laboratory and shall:
1. Make available without cost samples of all materials to be tested in accordance with applicable standard specifications.
2. Furnish such nominal labor and sheltered working space as is necessary for testing laboratory to obtain samples at the project site.
3. Advise the laboratory of the identity of material sources and instruct the suppliers to allow tests or inspections by the laboratory.
4. Notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.
5. Notify the laboratory sufficiently in advance of cancellation of required testing operations. The Contractor shall be responsible for charges due to failure to notify if requirements for testing are canceled.

1.5 TEST METHODS

A. Tests and inspections shall be conducted in accordance with the technical provisions of the latest applicable A.S.T.M., A.C.I., A.A.S.H.T.O. or L.D.O.T.D. requirements.

B. Laboratory shall promptly notify Architect, Engineer, and Contractor of any materials which are not in full conformance with the specifications.

PART 2 - TESTING

2.1 PORTLAND CEMENT CONCRETE

A. Mix Design
1. The laboratory shall be responsible for the design of each specified mix.
2. The design shall be based on the desired strength and a statistical analysis provided by a qualified testing laboratory or by trial batches which will be performed by the designated laboratory. Both methods shall be in accordance with and limited to the requirements set forth by the American Concrete Institute (A.C.I.) 318-02.
3. If trial batches are required, sufficient time must be given to the laboratory to perform all tests that are required.

4. Regardless of what method is employed, the following tests are required prior to use on a given project:

   A.S.T.M. C-136 - Sieve Analysis for Fine and Coarse Aggregates.

   A.S.T.M. C-127 - Test Method for Specific Gravity & Absorption of Coarse Aggregate.

5. Certificates of Delivery which include test results shall be submitted by the concrete producer for cement and additives to the testing laboratory for review. These certificates must certify that the material conforms to the specifications.

B. Batch Plant

1. Prior to initial start-up of concreting operations for the project the testing laboratory shall visit the concrete supplier's batch plant to determine if the operation substantially conforms to the requirements of A.S.T.M. C94. Any substandard conditions observed shall be immediately reported to the Engineer and the Contractor.
2. Plant inspector is not required to be present at the plant during production. However, the Engineer may require an inspector to be provided periodically at his discretion.
3. The plant must be approved prior to beginning production for a given project. This approval will be given by the Engineer and/or his representative. Conditions for approval shall include but not be limited to the following:

   i. A.S.T.M. C-94 (latest revision) Standard Specifications for Ready Mixed Concrete.

   ii. Prior to and periodically during construction the laboratory shall sample and test aggregates proposed for use in concrete to determine their compliance with these specifications.

C. Pavement Inspection

1. The laboratory shall provide a qualified technician at the job site during all times concrete is being placed. This technician shall be responsible to perform the required field tests and promptly notify the Contractor of any sub-standard materials or workmanship being incorporated in the Work.
2. Samples of fresh concrete shall be gathered in accordance with A.S.T.M. C-172 (latest revision).

3. Test for slump - A.S.T.M. C-143 (latest revision) and air content - A.S.T.M. C-173 or C-231 (latest revisions) if applicable, must be performed whenever test cylinders are taken, and more frequently when deemed necessary.
4. The concrete temperature shall be measured and recorded when each set of cylinders is molded.
5. Test cylinders shall be cast in accordance with A.S.T.M. C-31 (latest revision) as follows:

   i. Pavements: One set consisting of 4 cylinders shall be cast for each 50 cubic yards or fraction thereof. A minimum of 4 cylinders shall be cast per visit.

   ii. Curbs: One set of 4 cylinders shall be cast each day curbs are constructed.

   iii. Combination Curb & Gutters: One set of 4 cylinders shall be cast for each 25 cubic yards or any fraction thereof. A minimum of 4 cylinders shall be cast per visit.
6. Sample cylinders are to be tested in accordance with A.S.T.M. C-39 (latest revision) as follows:

   2 @ 7 days of age
   2 @ 28 days of age
7. During production, if any truck of ready mixed concrete fails to conform to specifications, the Laboratory will immediately notify the Contractor and the Engineer and this material shall not be incorporated in the work.
8. Re-tempering of concrete is not permitted.

D. Drainage and Utility Structures
1. Obtain cylinders and test in accordance to A.C.I. 301.
2. Sample cylinders are to be tested in accordance with A.S.T.M. C-39 (latest revision) as follows:

   2 @ 7 days of age
   2 @ 28 days of age
3. Observe the consistency of all concrete delivered to the site and in addition to 1 above make any and all additional tests which, in the opinion of the laboratory technician, are justified because of the consistency, uniformity, slump or appearance of the concrete.

2.2 (NOT USED)

2.3 BASE AND SUBBASE

A. Soil
1. Tests to determine soil classification shall be conducted on all soils to be used on the project. Tests shall be performed for each 2,000 C.Y. of material.
2. A moisture-density curve shall be determined for each material. A new curve shall be determined for each 4,000 C.Y. of material. Unless otherwise noted, moisture-density tests shall be performed according to ASTM or L.D.O.T.D. specifications.
3. Field density tests shall be made on the completed material and the thickness shall be measured. One density test shall be made for each five thousand (5000) square feet of pavement. The thickness of the material shall be measured at three points across the width of the pavement at each station where density tests are performed.
4. Field density for soils for subbase shall be based on A.S.T.M. D698. Minimum density shall be 97% of maximum dry density.

B. Granular Base
1. A moisture-density curve shall be determined for each type of base material.
2. Field density tests and thickness measurements shall be made on each five thousand (5000) square feet of completed base.
3. Field density test shall be based on A.S.T.M. D698. Minimum density shall be 97% of maximum dry density.

C. Retesting Base
1. If the base course is subjected to rain or other moisture changes, retesting is required before placing concrete for pavement.

2.4 CONCRETE REINFORCEMENT INSPECTING AND TESTING

A. Prior to use, submit mill certificates or test all reinforcement steel bars for compliance with the specified standards.
1. Material identified by mill test reports, and certified by the testing laboratory, does not require additional testing. Require the supplier to furnish mill test reports to the testing laboratory for certification.
2. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.

B. Unidentified Steel:
1. Have the testing laboratory select samples consisting of two pieces, each 18" long, of each size.

2. Have the testing laboratory make one tensile test and one bend test for each 2-½ tons or fraction thereof of each size of unidentified steel.

C. Provide continuous inspection for all welding of reinforcement steel.

D. Require certification of all welders.

2.5 WATER DISTRIBUTION

A. Hydrostatic pressure and leakage tests will be performed by the Contractor in the presence of the testing laboratory technician. The testing laboratory shall issue a report stating the results of the tests and confirming that the water distribution system meets or does not meet the requirements of this Specification. Test pressure shall be 150 psi.

B. After the pressure and leakage tests have been satisfactorily completed, the Contractor shall remove all hydrant cps (hose nozzle and pumper nozzle caps) and grease the nozzle threads. Then the hydrant caps shall be replaced and the man hydrant valves shall be fully opened. The hydrants shall be tested for leakage in this manner with the System pressure on the mains. Each hydrant will be required to withstand this test without leakage. The testing laboratory shall witness the test and shall issue a written report.

2.6 WASTEWATER COLLECTION SYSTEM

A. Gravity Pipe
1. All sewer lines shall be “LAMPED” between manholes. Contractor shall provide personnel and equipment and assist testing laboratory and Architect. Equipment furnished shall be mirrors, battery operated lights, and canister type gas masks.
2. The full cross section shall be visible when lamped between manholes. The sewer shall be true to line and grade, clean, have no cracked or broken pipes or defective joints. A written report shall be issued.
3. Contractor shall furnish the measuring devices ad provide the assistance to conduct the infiltration test. The test will be conducted in the presence of a representative of the testing laboratory and the testing laboratory shall certify the test and issue a report.
4. The allowable leakage under the exterior ground water pressure shall not exceed zero (0) gallons per day per mile of pipe per inch diameter per 24 hours. In conducting the test, the system can be tested in its entirety or broken down into connecting mains. In

determining the length of section tested, manholes, junction boxed, etc. will be added in as pipe length and not considered separately.

PART 3 - PAYMENT

3.1 PAYMENT FOR TESTING

A. Unless stated otherwise in the special provisions, the Contractor shall include within the lump sum contract, an amount sufficient to cover all testing and inspection required by these specifications and any additional testing required by governmental agencies having jurisdiction over the work.

END OF SECTION 01 45 29

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Division 31 Section "Dewatering" for disposal of ground water at Project site.
3. Division 32 Section "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost.

B. Water Service: **Pay** water service use charges for water used by all entities for construction operations.

C. Electric Power Service: **Pay** electric power service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide **galvanized steel** bases for supporting posts.

B. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of **10** individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine in each field office.
b. Provide one telephone line(s) for Owner's use.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

   a. Provide temporary, directional signs for construction personnel and visitors.

F. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

D. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

   1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 01 57 19 – TEMPORARY EXTERIOR ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work Included: The work included herein shall constitute the criteria for temporary exterior environmental controls. This section includes requirements for the Stormwater Pollution Prevention Plan (SWPPP) for this project. All work indicated and/or implied herein shall be part of Contractor's Base Bid.

1. This work consists of providing temporary erosion control on the project and in areas outside of the project where work is accomplished in conjunction with the project; to prevent pollution of water, detrimental effects to adjacent property ad property adjacent to the right-of-way. These measures shall consist of construction and maintenance of temporary erosion control features either shown on the plans or as directed.
2. Installation of temporary erosion control features shall be coordinated with construction of permanent erosion control features to the extent necessary to ensure economical, effective and continuous control of erosion and water pollution throughout the life of the contract.
3. Prior to the start of construction, the contractor shall present the proposed schedule for construction of the project in accordance with requirements of this Section. The schedule shall be in written form. The contractor shall prepare a SWPPP which shall include the schedule, the sequence of clearing and grubbing, earthwork operations, construction of permanent erosion control features, and proposed use of temporary erosion control features. It shall also include proposed methods to prevent pollution on private haul roads, borrow pits, material pits, public rights-of-way and areas used for disposal of waste materials form the project.

A. Referenced Specifications

1. When reference is made to Sections and Subsections those contained in these specifications, the reference is to the pertinent section of L.D.O.T.D. "Louisiana standard Specifications for Roads and Bridges", 2006 Edition.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 1 Specification Sections, apply to this Section.

B. Referenced Specifications
1. When reference is made to Sections and Subsections those contained in these specifications, the reference is to the pertinent section of L.D.O.T.D. “Louisiana Standard Specifications for Roads and Bridges, 2006 Edition.

1.3 QUALTIY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of the work in this Section.

1.4 NOTICE OF INTENT

A. Contractor is responsible for meeting all local, state and federal regulations regarding erosion control including the applicable provisions of the National Pollution Discharge Elimination System (NPDES) regulations from the Federal Clean Water Act.

B. Contractor and Owner shall each submit a LPDES Notice of Intent (NOI) to the State of Louisiana prior to commencing construction if the area disturbed by construction is equal to or greater than five (5) acres.

C. Contractor shall prepare the Stormwater Pollution Prevention Plan (SWPPP), coordinate with Owner, and file in accordance with regulations.

D. A copy of the SWPPP shall be available at the site and shall be followed during construction.

E. At the conclusion of construction after the Owner has accepted the work, and if an NOI was submitted to the State of Louisiana, Contractor and Owner shall each submit an LPDES Notice of Termination (NOT) to the State of Louisiana. A sample of the NOT may be found at the end of this Section.

PART 2 – MATERIALS

2.1 GENERAL

Materials not covered by project specifications shall meet commercial grade standards and shall be approved before being incorporated into the project. No testing of materials will be required for temporary erosion control features. Acceptance of temporary erosion control materials will be by visual observations.

A. Mulches: Vegetative mulch shall conform to L.D.O.T.D. subsection 1018.19 and emulsified asphalt shall conform to Section 1002.

B. Seeding: Grass shall be an approved quick-growing species suitable to the area, providing a temporary cover which will not compete with permanent gasses. Rye grass is the only acceptable grass for winter cover.

C. Slope Drains: Slope drains may be constructed of pipe, fiber mats, rubble Portland cement concrete, Asphalted concrete, plastic sheets or other acceptable material.

D. Fertilizer: Fertilizer shall conform to L.D.O.T.D. Subsection 1018.16

E. Silt Fencing: Silt fencing shall be wire-supported or self-supported systems. Other silt fencing systems may be used when approved.

1. Wire-supported: Wire-supported silt fencing shall consist of standard woven livestock wire, and minimum of 14-gage wire, a minimum of 36 inches in height with a maximum spacing of 6 inches. Posts shall be either wood or steel installed a minimum shall be burlap weighing approximately 7 ½ ounces per square yare, approved jute fabric or approved geotextile fabric. Geotextile fabric shall conform to L.D.O.T.D. Section 1019, Type F.
2. Self-Supported: Self-supported silt fencing shall consist of an approved geotextile fabric suitably attached to posts of either wood or steel installed a minimum of 2 feet in the ground. Geotextile fabric shall conform to L.D.O.T.D. Section 1019, Type G.

F. Lime: Agricultural lime shall conform to L.D.O.T.D. Subsection 1018.17.

PART 3 – EXECUTION

3.1 CONTROL OF ERODIBLE SOIL

A. A copy of the Contractor's SWPPP shall be available at the construction site at all times. The SWPPP shall be implemented during construction until the project is accepted by the Owner.

B. General: The Contractor shall prevent the transmission of soil particles into streams, canals, lakes, or other waterways. Except as necessary for construction, excavated materials hall not be deposited into streams or impoundments, or in a position close enough to be washed in waterways by high water or runoff. The Contractor shall not disturb lands or waters outside the limits of construction, except as authorized by the Architect.

C. Adjacent to Waterways: Stream banks shall be kept in their natural state. The Contractor shall not unnecessarily strip protective vegetation in the vicinity of stream banks and shall conduct operations without damage to banks. No bank shall be excavated except as shown on the pans. No work roads shall be constructed upstream when it is necessary to cut the banks unless approved in writing. Banks cut for work roads shall be located downstream and replaced by the Contractor to their original shape & density. Unnecessary stripping of vegetation along banks in the construction area will not be permitted.

D. Adjacent to Property: The location of, and method of operation in, borrow pits, material pits and disposal area furnished by the Contractor for waste material from the project (other than commercially operated sources) shall meet the approval of the engineer as being such that erosion during and after completion of the work will not result in detrimental salutation or water pollution.

E. Exposure of Redouble Earth: The Engineer may request limiting the surface areas of unprotected redouble earth exposed by clearing and grubbing, excavation or embankment operations. When requested, the Contractor shall provide immediate permanent or temporary erosion or pollution control measures to prevent contamination of streams, lakes, tidal waters, reservoirs, canal or other impoundments to prevent detrimental effects on property outside the right-of-way and damage to the project. Limitation of areas in which excavation and embankment operations are underway shall be commensurate with the Contractor's capability and progress in keeping finish grading and permanent erosion control measures in accordance with the accepted schedule.

F. Incorporation of erosion control features: Contractor shall use temporary erosion control features to correct unforeseen conditions that develop during construction; to control erosion prior to the time it is practical to construct permanent control features; or to provide immediate temporary control of erosion that develops during normal construction operations, but is not associated with permanent erosion control features. Permanent erosion control features shall be incorporated into the project at the earliest practical time.

G. Temporary erosion control features will be used in area where stage construction or other conditions not under control of the Contractor preclude completion of a section of work in a continuous manner, or where subsequent construction operations will cause damage to permanent erosion control features.

3.2 TEMPORARY EROSION CONTROL

A. Temporary erosion control features shall consist of, but not be limited to, temporary seeding, temporary mulching, sandbagging, slope drains, sediment basins, sediment check dams, erosion checks, artificial coverings, and beams. The engineer may direct the Contractor to use additional temporary erosion control features or methods other than those in use. Soil deposits outside the work shall be immediately removed and the surface repaired at no direct pay. Operations shall be discontinued until erosion deposits have been cleared and the area restored.

B. Temporary Seeding: Seeding shall be done in accordance with L.D.O.T.D. Section 717, except that ground preparation will be limited to balding the area. Lime or fertilizer shall be applied in accordance with Section 718; however, lime or fertilizer may be omitted or the application rate reduced as directed.

C. Temporary Mulching: Vegetation mulch and emulsified asphalt shall be furnished and applied in accordance with L.D.O.T.D. Section 716. Mulch may be omitted or the application rate reduced as ordered. When permanent seeding operations begin, temporary mulch materials shall be plowed under during ground preparation.

D. Sandbagging: Sandbags shall be placed as necessary.

E. Baled Straw or Hay: Baled straw or hay shall be placed as directed to form checks or dams to control erosion and silt ration. Bales shall be properly staked or otherwise secured as directed as shown

on the plans. The bale shall be buried 4-6 inches. Two 2-inch by 2-inch by 3-foot stakes shall be driven through each bale, flush to the top of the bale.

F. Slope Drains: Slope drains shall be constructed with acceptable materials in accordance with plan details or as directed. The discharge area shall be stabilized or protected by temporary riprap as directed. Cost of discharge area protection will be included I Contractor's bid.

G. Sediment Basins: Sediment basins shall be constructed as necessary. The Contractor may use the stormwater detention ponds as sediment basins during construction. Clean and reshape ponds before completion of the project.

H. Sediment Check Dams: Check dams shall be constructed at locations as necessary. Check dams shall be constructed before clearing and grubbing or grading in the area is begun unless otherwise directed.

I. Silt Fencing: Silt fencing shall be furnished and constructed at designated locations and at additional locations around the site as necessary.

J. Beams: Earth beams shall be constructed to divert the flow of water form redouble surfaces.

K. Unforeseen conditions: When unforeseen conditions are encountered, the Contractor shall construct such temporary devices a required to control erosion during construction. Details shall be developed by the contractor and submitted to the Architect.

L. Maintenance of Erosion control Features: Temporary erosion control devices shall be replaced as necessary at no direct pay. Sediment shall be removed in a timely manner to prevent blow out or overtopping at no direct pay.

M. Removal of Temporary Erosion Control Features: Temporary erosion control features existing at the time of construction of permanent erosion control features shall be removed or incorporated into the soil in such manner that no detrimental effect will result. If necessary to protect the site, temporary features shall be left in plane. Sediment in sediment basins, silt fences, check dams, and other catchments areas shall be removed, replaced with

acceptable soils in accordance with L.D.O.T.D. Subsection 203.06, and compacted as directed at no direct pay.

N. Immediately hydro mulch drainage ditches upon final grading.

O. Repair erosion of the banks of the drainage ditches immediately and re-stabilize.

P. Maximum Ditch Side Slopes: 3 feet horizontal to 1 foot vertical except where noted otherwise.

Q. Maintenance of the ditches during construction shall include but not be limited to mowing, re-grading, sediment removal, re-hydromulching, bank repair and debris removal.

R. Sediment removed form the ditches may be re-spread on the site as directed by the Architect.

S. Fill slopes in all cases shall be no steeper than 3:1 unless specifically stated on the plans or approved by the Architect.

T. For permanent slopes, cut or fill, between 2:1 and 10:1, erosion protection shall be provided with hydromulching, sodding, seeding, or other method as approved.

3.3 PROTECTION DURING SUSPENSION OF CONTRACT TIME

3.4 Prior to the suspension of operations, the Contractor shall shape the top of the earthwork in such manner as to permit runoff of rainwater and shall construct earth berms along the tip edges of embankments to intercept runoff water. Temporary slope drains shall be provided in the earth berm to carry runoff. When such preventive measures fail, the Contractor shall immediately take other action as necessary to prevent erosion and siltration. The Contractor shall perform other erosion control work during suspensions of contract time if necessary to protect work on the project.

END OF SECTION 01 57 19

SECTION 015813 - PROJECT IDENTIFICATION SIGN

PART 1 GENERAL

1.1 REFERENCES

A. Lumber Standard: American Softwood Lumber Standard; U.S. Department of Commerce Product Standard PS 20.

B. Softwood Plywood Standard: Construction and Industrial; U.S. Department of Commerce Standard PS 1.

1.2 SUBMITTALS

A. Samples: Match colors specified.

1.3 QUALITY ASSURANCE

A. Painter's Qualifications: Lettering and striping shall be applied by a professional sign painter.

PART 2 PRODUCTS

2.1 MATERIALS

A. Framing and Posts: Standard Grade Douglas Fir, Hem-Fir, White Pine or Southern Pine; S4S; preservative treated.

B. Plywood: Overlaid Plywood, MDO B-B EXT-APA.

C. Background Enamel: Exterior alkyd gloss enamel conforming to FS TT-E-489, Class A; or Sherwin Williams' "Kem Bulletin Colors", or T.J. Ronan Paint Corporation's "Outdoor Advertising Bulletin Colors".
   1. Primer: As recommended by finish coat manufacturer for the substrate and finish material.

D. Lettering Enamel: Exterior, long-oil, alkyd, high gloss enamel manufactured for lettering signs; Sherwin Williams' "Kem Bulletin Colors" or T.J. Ronan Paint Corporation's lettering colors.

E. Enamel Colors: Match St Bernard Government Logo colors.

2.2 FABRICATION AND PAINTING

A. Construct sign per dimensions and general layout shown in drawings at the end of this specification section.

B. Fasten framing members together with 16d common nails.

C. Fasten plywood to framing members with 8d finishing nails spaced 12 inches on center. Set nail heads and fill holes flush with plywood face with wood filler.

D. Painting:
1. Paint both sides and all edges of sign with 2 coats of primer and one coat of background enamel.
2. Paint lettering and striping with 2 coats of lettering enamel.
3. Apply paint at manufacturer's recommended spreading rate in even coats of uniform thickness without brush marks, runs, or lap marks. Do not apply succeeding coat until previous coat has completely dried.
4. Lettering and striping shall be uniform with sharp, neat profiles.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install sign within one week after Work begins at the site.

B. Set posts plumb, 4 feet into the ground. Compact backfill around posts.

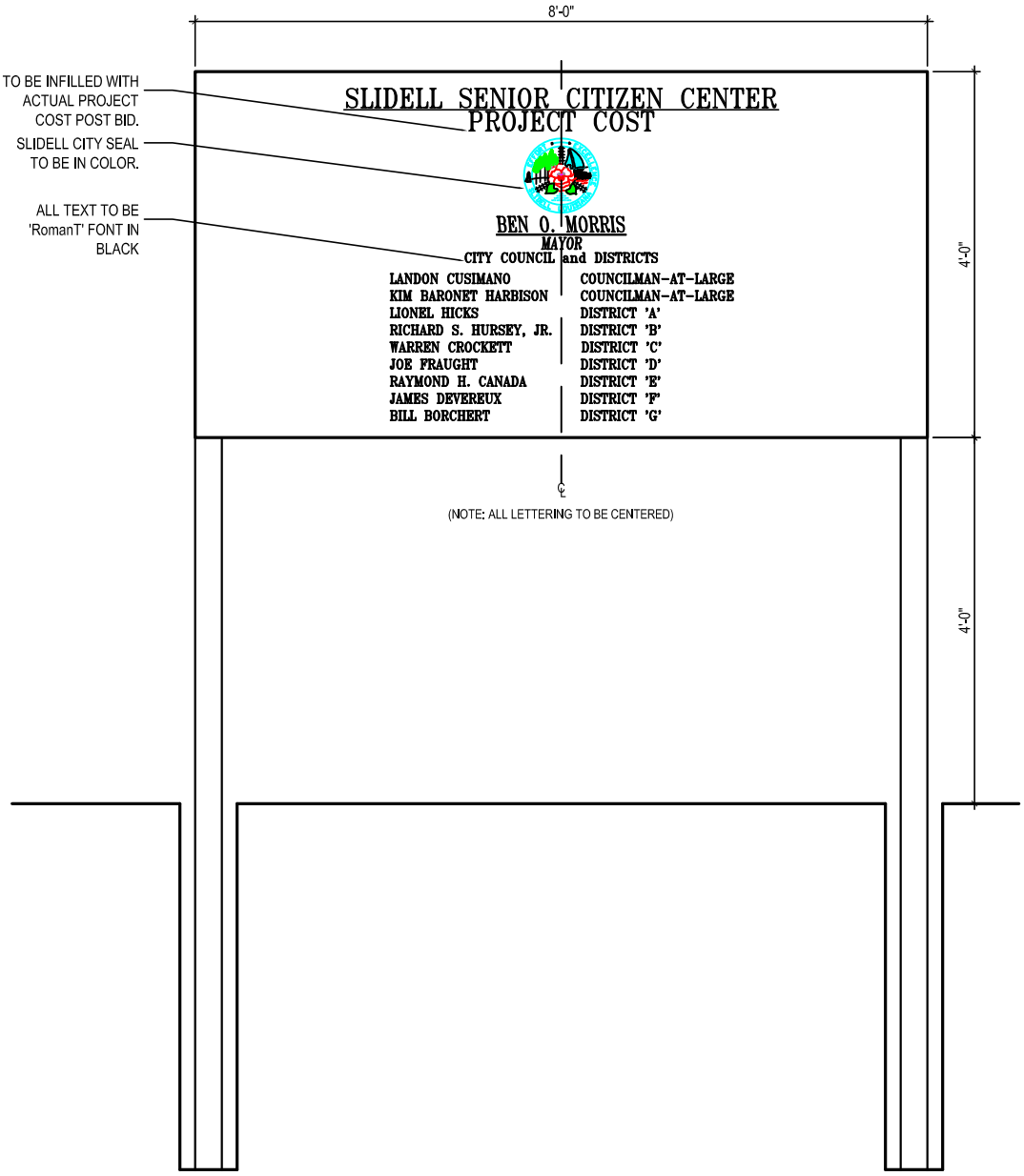
C. Fasten sign framing, in a level position, securely to posts with 16d common nails (minimum 3 per post).

3.2 MAINTENANCE AND REMOVAL

A. Maintain the sign plumb and level for the duration of the Work.

B. When directed, at completion of project, remove sign from City property.

END OF SECTION 015813



1 ELEVATION

SCALE: N.T.S.

Perez.

SLIDELL SENIOR CITIZEN CENTER

CONSTRUCTION SIGN

Project No.: 01-09-1074

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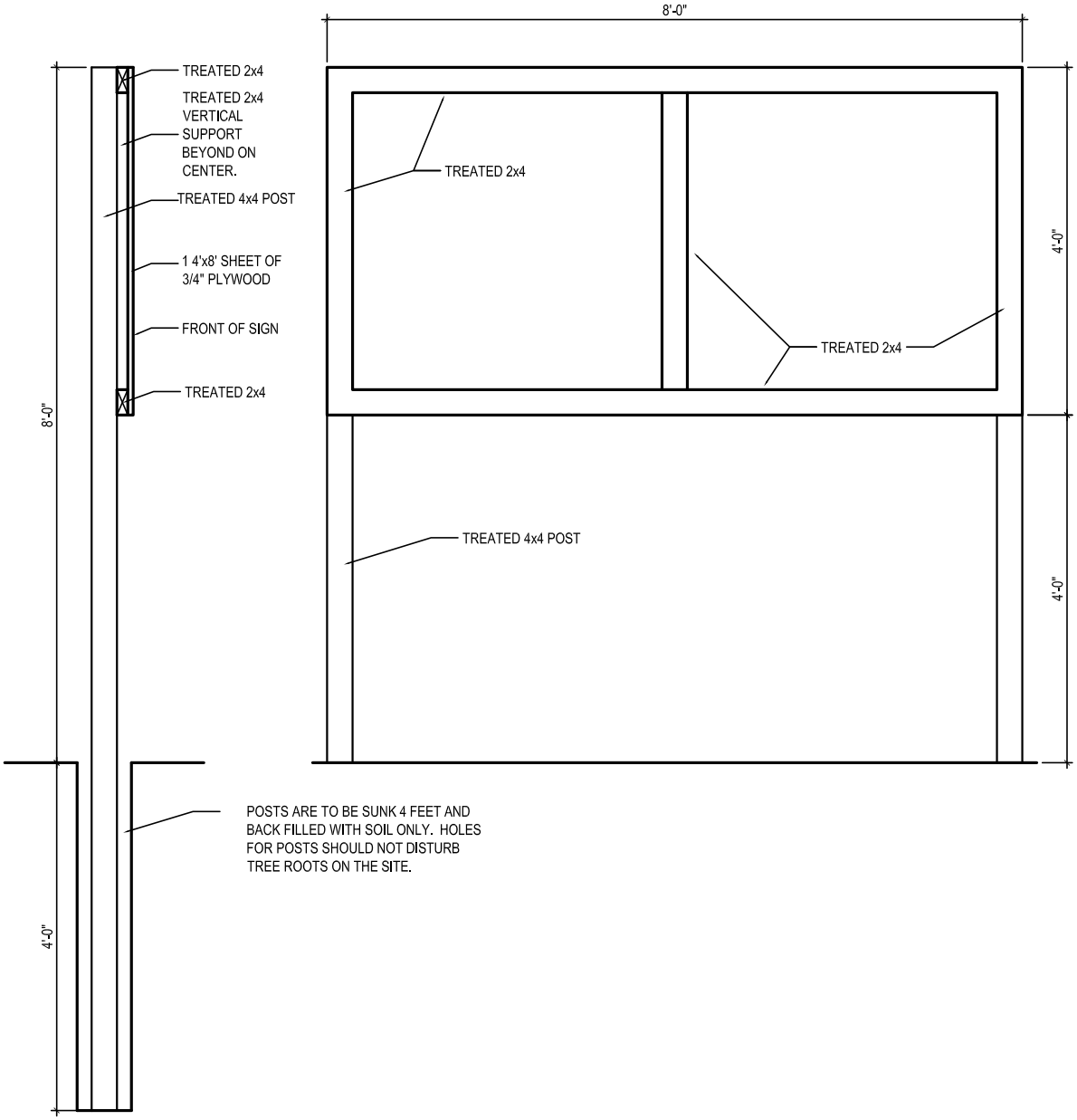

1	SECTION SCALE: N.T.S.	2	FRAMING SCALE: N.T.S.

Perez.

SLIDELL SENIOR CITIZEN CENTER

CONSTRUCTION SIGN

Project No.: 01-08-1074

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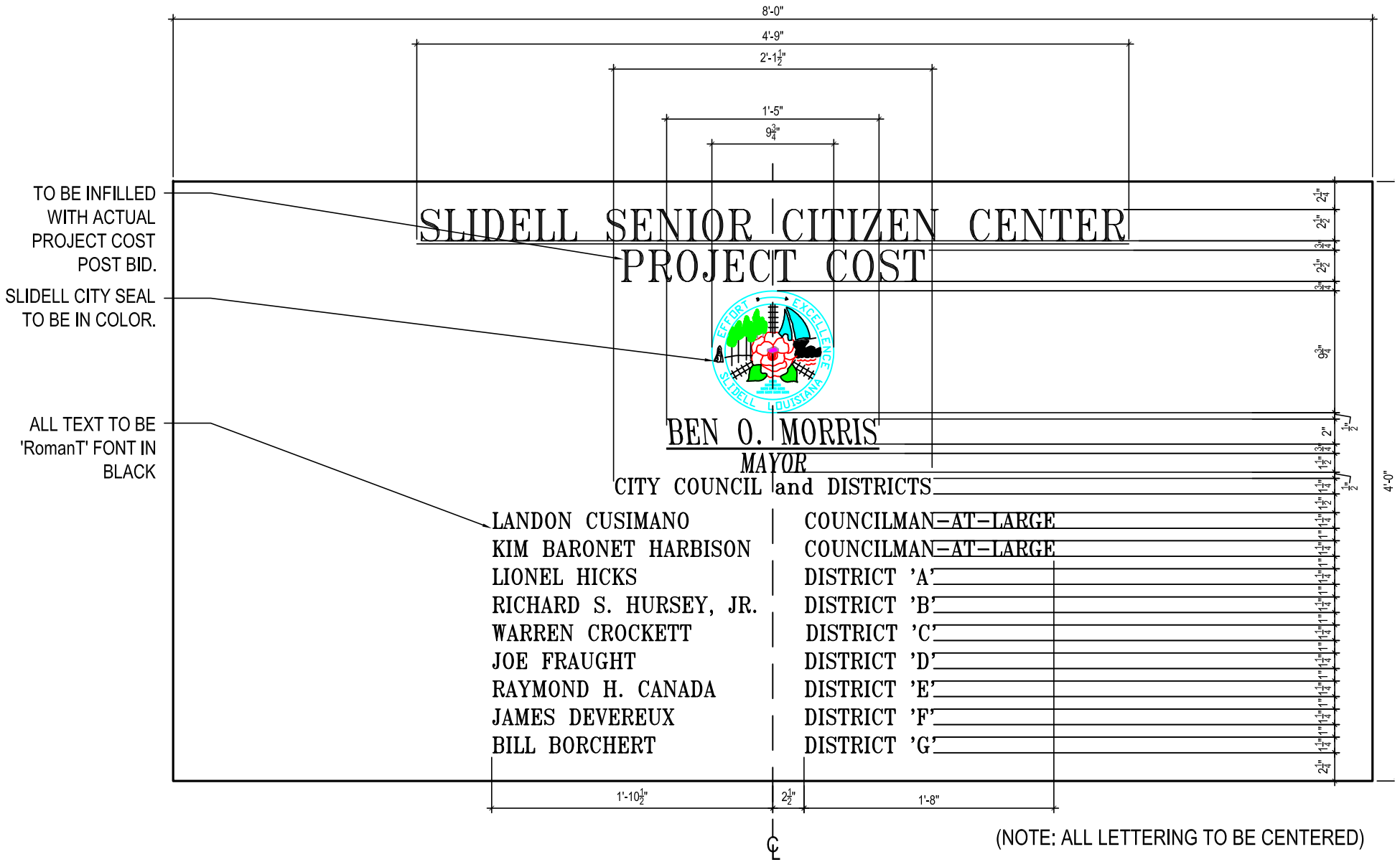

1 CONSTRUCTION SIGN
SCALE: N.T.S.

SLIDELL SENIOR CITIZEN CENTER

CONSTRUCTION SIGN
Project No.: 01-08-1074

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

1. Division 01 Section "Substitution Procedures" for requests for substitutions.
2. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
   a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:
   a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other

named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting surveys.
2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
4. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by [land surveyor] [professional engineer] certifying that location and elevation of improvements comply with requirements.

B. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Mechanical systems piping and ducts.
f. Control systems.
g. Communication systems.
h. Conveying systems.
i. Electrical wiring systems.

j. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Equipment supports.
   e. Piping, ductwork, vessels, and equipment.
   f. Noise- and vibration-control elements and systems.
   g.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, utilize products for patching that comply with requirements of Division 01 Section "Sustainable Design Requirements."

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

    a. Description of the Work.
    b. List of detrimental conditions, including substrates.
    c. List of unacceptable installation tolerances.
    d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Utilize containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Sections:

1. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
2. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.4 PERFORMANCE REQUIREMENTS

A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:

a. AAC, Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Insulation.
g. Carpet and pad.
h. Gypsum board.
i. Piping.
j. Electrical conduit.
k. Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis.

B. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within [three] <Insert number> days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Division 32 Section "Plants." for use of clean ground gypsum board as inorganic soil amendment.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.

D. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Sections:

1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Division 01 Section "Execution" for progress cleaning of Project site.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. **Three** paper copies of product schedule or list, unless otherwise indicated. Architect will return **two** copies.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within **15** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.

    1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.
3. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. **Three** paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return **two** copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least [**30**] days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or modify each manual to comply with Architect's comments. Submit copies of each corrected manual within **15** days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Agent.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, [**loose-leaf**] [**post-type**] binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide

essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents**, and indicate Specification Section number on bottom of spine**]. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.
   5. Power failure.
   6. Water outage.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source

information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Sections:

1. Division 01 Section "Execution" for final property survey.
2. Division 01 Section "Closeout Procedures" for general closeout procedures.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit **one** set of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal: Submit **one paper copy set** of marked-up record prints. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
b. Final Submittal: Submit **one paper copy set** of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.
c. Final Submittal: Submit **one paper copy set** of marked-up record prints,

B. Record Specifications: Submit **one paper copy** of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit **one paper copy** of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit **one paper copy** of each submittal.

E. Reports: Submit written report **weekly** indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.

i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect[for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders**, record Product Data,** and record Drawings where applicable.

B. Format: Submit record Specifications **of marked up paper copy of Specifications**.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders[**, record Specifications,**] and record Drawings where applicable.

B. Format: Submit record Product Data as **paper copy**.

1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as **paper copy**.

1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

DIVISION 02 – EXISTING CONDITONS (Not Used)

DIVISION 03 – CONCRETE

SECTION 330000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope: The work to be done under this section of the specifications includes all labor, materials, equipment, and services necessary for cast-in-place concrete including formwork, reinforcing, mix design, placement procedures, finishes, as indicated on drawings and herein specified.

1.3 CAST-IN-PLACE CONCRETE**:** Includes the following:

A. All concrete shown on the drawings.

B. Equipment pads and bases.

1. Include all concrete pads and supports for mechanical and electrical equipment where indicated. Unless otherwise shown, these pads shall include concrete of the size required to support the equipment purchased and 500 lbs. of reinforcing steel per cubic yard of concrete.

1.4 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.

C. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. Reproductions made from contract documents will not be allowed. Submit three prints. Two marked-up prints will be returned. Refer to Division 1 requirements.

D. Samples of materials as requested by Architect, including names, sources, and descriptions.

E. Laboratory test reports for concrete materials and mix design test.

F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 301-89, "Specifications for Structural Concrete for Buildings."
2. ACI 318, "Building Code Requirements for Reinforced Concrete," current edition.
3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice,"current edition.

B. Concrete Testing Service: The Owner shall employ a testing agency to perform material evaluation tests and to design and approve concrete mixes. Refer to paragraph 3.16.

C. Materials and installed work may require testing and retesting at any time during progress of Work. Retesting of rejected materials for installed Work shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Creating Void Areas: Fiberboard carton forms completely wax impregnated throughout with water resistant paraffin and polyethylene and designed to carry a uniformly distributed top load up to 1000 p.s.f.

D. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal.

Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60 deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Deformed-Steel Welded Wire Fabric: ASTM A 497.

E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material ill not support chair legs.
2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1).

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

B. Fly Ash: None Allowed.

C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

D. Lightweight Aggregates: ASTM C 330.

E. Water: Potable.

F. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

H. Water-Reducing Admixture: ASTM C 494, Type A.

I. High-Range Water-Reducing Admixture: ASTM C 494, Type approved by Architect.

J. Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.

K. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

2.4 RELATED MATERIALS

A. Vapor Retarder: Provide vapor retarder conforming to ASTM E1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape. Material shall be Stego Industries Stego Wrap (15 mil) Vapor Barrier or Reef Industries Vapor Guard by Griffoyln.

B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

D. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.

1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 mg per liter.

E. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.

F. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

G. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.

H. Bonding Agent: Polyvinyl acetate or acrylic base.

I. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

J. Waterstops: Dumbbell or centerbulb polyvinyl chloride type conforming to CRD-C572. Size and configuration shall be as indicated on the Drawings.

2.5 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method,

use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been submitted to Architect.

C. Design mixes to provide normal weight concrete or light weight concrete with the 28-day compressive strength as indicated on drawings.

D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Not more than 4 inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 40 deg F (10 deg C) and falling.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reducemixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes. Ice can be added to concrete so that delivery time can remain at 1-1/2 hours.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of cor-

rect size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

A. General: Under all slabs on grade, place vapor retarder/barrier.

B. Installation shall be in accordance with ASTM E1643 and manufacturer’s instructions.

C. Install bentonite waterproofing as indicated in drawings and in accordance with manufacturer’s instructions.

3.4 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.

D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Where not specifically detailed on the drawings, support slab top reinforcing bars with continuous #4 reinforcing bars. Slab top reinforcing bars less than 6 feet in length shall have two support bars and slab top reinforcing bars greater than 6 feet in length shall have support bars spaced at no more than 3’-0” o.c. These bars shall be equally spaced along the length of the slab top reinforcing bars.

3.5 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.

B. Provide keyways as indicated on drawings or at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

C. Provide dumbbell or centerbulb type waterstops at all construction joints in areas indicated on the drawings.

D. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

E. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

1. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
2. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

1. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. Maintain reinforcing in proper position on chairs during concrete placement.

E. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Grout Cleaned Finish: Provide where indicated on Drawings in accordance with ACI 301-89, paragraph 10.3.2.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.

3.10 MONOLITHIC SLAB FINISHES

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.

1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

E. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Light Brush Blasting: Apply light brush blasted finish to concrete to receive architectural finishes as indicated on drawings.

G. Finishing Tolerances – All slabs except Scratch Finish slabs shall be true planes within 1/8 in. in 10 ft, as determined by a 10- ft straightedge placed anywhere on the slab in any direction (ClassA) tolerance) Scratch Finish slabs shall be true planes within 1/4 in. in 10 ft, as determined by a 10-ft straightedge placed anywhere on the slab in any direction (Class B tolerance).

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

B. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

1. Provide moisture curing by the following methods:

   a. Keep concrete surface continuously wet by covering with water.
   b. Use continuous water-fog spray.
   c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

2. Provide moisture-retaining cover curing as follows:

   a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

   a. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
   b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

E. Curing Stained Concrete Flooring – Refer to Section 03360. Do not use curing compound.

3.13 REMOVING FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams,walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 12 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Comply with ACI 301-89, Chapter 4, Article 4.6 - Reshoring.

3.14 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be accceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.15 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Owner will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement shall include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

C. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

D. Test results will be reported in writing to Owner, Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may bepermitted but shall not be used as the sole basis for acceptance or rejection.

H. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 330000

DIVISION 04 – MASONRY (NOT USED)

DIVISION 05 – METALS

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope: This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

C. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts (each type), including nuts and washers.
3. Structural steel primer paint.
4. Shrinkage-resistant grout.

C. Shop drawings prepared under supervision of a Louisiana licensed Structural Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

3. See Section Submittals for shop drawings requirements. Reproductions made from contract drawings will not be accepted. Submit three prints. Two marked-up prints will be returned. Review of shop drawings by the Architect/Engineer will be for general compliance with contract documents. No responsibility will be assumed for correctness of dimensions, quantities or details.

4. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

5. All shop drawings used in the field must bear the Architect/Engineer shop drawings review stamp with "No Exceptions Taken" indicated.

D. Mill Test Reports: Submit manufacturer's certified test reports to the testing laboratory and architect showing chemical analysis and results of tensile and bending tests. Tests shall meet the requirements of ASTM A6/A6M.

E. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.4 QUALITY ASSURANCE

A. Standard Specifications: Except as modified or supplemented by these specifications, materials, design, fabrication, and erection of Structural Steel shall be in accordance with the American Institute of Steel Construction's "Specifications for Structural Steel for Buildings, Allowable Stress Design and Plastic Design", June 1, 1989, and the A.I.S.C. "Code of Standard Practice for Steel Buildings and Bridges", September 1, 1986. A.I.S.C. "Manual of Steel Construction, Allowable Stress Design", Ninth Edition.

B. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."

a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:

"This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."

2. AISC "Specifications for Structural Steel Buildings," including "Commentary."

3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.

4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."

5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

C. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel:

1. Shapes, except for channels, angles, and plate: ASTM A992 Grade 50.

2. Channels, angles, and plate: ASTM A36.

C. Cold-Formed Steel Tubing: ASTM A 500, Grade B, min. fy = 46 ksi.

D. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501, min. fy = 35 ksi.

E. Anchor Bolts: ASTM A 307, non-headed type unless otherwise indicated.

F. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide hexagonal heads and nuts for all connections.

G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows.

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325.

2. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.

H. Electrodes for Welding: Comply with AWS Code.

1. Welding electrodes for manual shielded metal-arc welding shall conform to AWS A5.1 or A5.5 E70XXX welding electrodes and flux used in submerged arc process shall conform to AWS A5.17 F7X-EXXX. Use low hydrogen electrodes for A572 steel.

I. Structural Steel Primer Paint: Rust-inhibitive conforming to Fed. Spec. TT-P-664 and be compatible with finish paint systems.

J. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 2.0 parts sand, by volume, with minimum water required for placement and hydration.

K. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.

2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

1. Bolt field connections, except where welded connections or other connections are indicated.

C. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

D. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

1. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.

1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.

2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.

3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.4 GALVANIZING

A. Items shown on the plans to be galvanized and bolts for same shall be hot dip zinc coated after fabrications. Galvanizing shall be done in accordance with A.S.T.M. Serial Designation A123 and A153. Any zinc coating that is damaged shall be touched up with Galvacon as manufactured by Southern Coatings in accordance with the manfacturer's recommendations.

2.5 SOURCE QUALITY CONTROL

A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components that do not comply.

B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary Members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

B. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

4. For proprietary grout materials, comply with manufacturer's instructions.

D. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure within specified AISC tolerances.

2. Splice members only where indicated and accepted on shop drawings.

E. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

F. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

G. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2. QUALITY CONTROL

A. The Owner shall engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

1. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

3. Testing agency may inspect structural steel at plant before shipment.

B. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

C. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.

D. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3. Perform tests of welds as follows.
Ultrasonic Inspection: ASTM E 164.

E. Field-Bolted Connections: Inspect in accordance with AISC specifications.

F. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3. Perform tests of welds as follows:

Ultrasonic Inspection: ASTM E 164.

END OF SECTION 051200

SECTION 052100 – STEEL JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: All steel joist work as shown on the drawings.

1.3 QUALITY ASSURANCE

A. Standard Specifications: Except as modified or supplemented herein, materials, designs, fabrication, painting and erection of all steel joists and bridging for same shall be in accordance with the latest edition of the following publications of the Steel Joist Institute, as applicable:

1. Standard Specifications for Open Web Steel Joists, K-Series.
2. Standard Specifications for Long Span Steel LH-Series and Deep Long Span Steel Joists, DHL-Series.
3. Standard Specifications for Joist Girders.
4. Recommended Code of Standard Practice for Steel Joists and Girders.

B. Welders: All welders for field welds shall be approved by an independent Testing Laboratory in accordance with American Welding Society standards and qualified for the type of welding which they will perform.

1.4 SUBMITTALS

A. Manufacturer's Data: For information only, submit 2 copies of manufacturer's specifications and installation instructions for each type of joist, joist girder and its accessories. Include manufacturer's certification that joists comply with "Standard Specifications".

B. Shop Drawings: Submit detailed drawings showing layout and erection of joists, special connections, jointing and accessories. Include the mark, number, size and properties, panel point locations, type, locations and spacing of joists and bridging. See Section - Submittals for shop drawing requirements. Reproductions made from contract drawings will not be acceptable. Submit three prints. Two marked-up prints will be returned. Refer to Division 1 requirements.

C. Design Computations: Furnish design computations bearing the seal and signature of a Civil Engineer with State of Louisiana registration for all joists and bridging required to be designed for wind uplift. Refer to Division 1 requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURE

A. See Article "Standard Specifications" preceding. Manufacturer of steel joists must be a member of the Steel Joist Institute or must be approved by the Architect prior to receipt of bids. Where ends of K- Series joists bear less than 2-1/2" on beams, joist manufacturer shall design the joist ends to provide for the reduced bearing. Staggering of joists will not be permitted.

2.2 MATERIALS

A. GENERAL

1. Comply with "Standard Specifications".
2. In designing joists and bridging, the uplift requirements, if any, required by the drawings must be met.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with "Standard Specifications".

3.2 FIELD CONNECTIONS

A. All field connections of steel to steel, including bridging, shall be welded.

B. The Owner’s independent Testing Laboratory shall visually inspect all connections in field to determine quality, size, and compliance with reviewed erection drawings. Where the quality of a weld is in question, the Architect will be advised. The Contractor may then be required to remove and reweld the connection or if the Contractor desires he may have the weld inspected further by radiography. The cost of this radiography inspection will be borne by the Contractor whether or not the weld is acceptable.

3.3 FIELD PAINTING

A. After erection, all field connections, welds, and abraded places shall be touched-up with same paints as shop coat. Refer to Section - Painting, for additional field coats of paint.

END OF SECTION 052100

SECTION 053000 – STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. All steel decking as shown on the drawings.

B. Standing Seam Metal Roofing, if required by the drawings, is specified in Division 7.

1.3 QUALITY ASSURANCE

A. Standard Specifications: Except as modified or supplemented herein, the decking shall be designed in accordance with the latest edition of AISI "Specifications for the Design of Cold-Formed Steel Structural Members and all applicable requirements contained in "Design Manual for Composite Decks, Form Decks and Roof Decks" of the Steel Deck Institute, Inc.

B. Testing – Owner’s independent testing laboratory shall witness all welded connections.

1.4 SUBMITTALS

A. Manufacturer's Data: For information only, submit 2 copies of manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certifications as may be required to show compliance with these specifications.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, cut openings, special jointing or other accessories. Submit three prints. Two marked-up prints will be returned. Refer to Division 1 requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Deck, Dimensions and Properties: Dimensions and properties of the various types of deck are shown on the drawings. Deck configurations shall be similar to that of the decks called for on the drawings. Allowable stresses shall be equal to that of the deck specified on the drawings.

B. Deck Coating: Galvanized, ASTM A525, G90.

C. Miscellaneous Steel Shapes: ASTM A36.

D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Deck sheets shall be erected and welded to supports in accordance with the manufacturer's specifications and erection layouts and as required to resist the uplift loads, if any, noted on thedrawings.

B. Side joints must be fastened together in accordance with manufacturer's specifications. Cutting openings through the deck less than 16 square feet in area, and all skew cutting shall be performed in the field. Deck shall be continuous over three (3) or more spans.

C. Except where other permanent type edge closures are shown on the drawings, provide sheet metal edge closures around the perimeter of all steel deck areas, including openings, where concrete is to be applied to the deck. Deck closures shall be of proper gage and configuration to retain the wet concrete.

3.2 TOUCH-UP

A. All damaged coating, including welds, shall be touched up with an approved coating before placing fill.

END OF SECTION 053000

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. See Division 6 “Miscellaneous Rough Carpentry” for wood blocking.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior wall nonload-bearing steel-stud walls.

1.3 PERFORMANCE REQUIREMENTS

A. AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and the following:

B. AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the following:

1. Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin, Vol. 2, No. 1, February 1993 "AISI Specification Provisions for Screw Connections."

C. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the following minimum physical and structural properties:

1. Physical and Structural Properties: As indicated.

D. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design framing systems to withstand design loads without deflections greater than the following:

a. Nonload-Bearing Walls: Lateral deflection of 1/360 of the wall height.
Up to 18’ high – 16” o.c.-6” - 16-GA - 1 5/8 Flange - Ix=2.94
Over 18’ high – 16” o.c. – 8” - 16-GA - 1 5/8 Flange - Ix=5.97
Deflection=1/240
Hortz Bridging @ 5’ o.c. Max

Fy must be 40,000 psi min.

2. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).

3. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

E. Design exterior and interior nonload-bearing wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

F. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of cold-formed metal framing, accessory, and product specified.

C. Shop drawings showing layout, spacings, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.

D. Mill certificates signed by manufacturers of cold-formed metal framing certifying that their products comply with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, and galvanized-coating thickness.

1. In lieu of mill certificates, submit test reports from a qualified independent testing agency evidencing compliance with requirements.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

G. Product test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing:

1. Expansion anchors.
2. Power-actuated anchors.
3. Mechanical fasteners.

H. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence cold-formed metal framing's compliance with building code in effect for Project.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated assemblies are indicated, provide cold-formed metal framing identical to that tested as part of an assembly for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: As indicated by design designations listed in UL "Fire Resistance Directory," or by Warnock Hersey or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction State of Louisiana and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this Project in material, design, and extent and that have a record of successful in-service performance.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the Work include, but are not limited to, the following:

1. Alabama Metal Industries Corp.
2. American Studco, Inc.
3. Angeles Metal Systems.
4. California Expanded Metal Systems, Inc.
5. Clark-Cincinnati, Inc.
6. Consolidated Fabricators Corp.
7. Consolidated Systems, Inc.
8. Dale//Incor Industries of Florida.
9. Dale Industries, Inc.
10. Design Shapes in Steel.
11. Dietrich Industries, Inc.
12. Incor Plant Dale Industries.
13. Knorr Steel Framing Systems.
14. MarinoWare; Div. of Ware Industries, Inc.
15. Super Stud Building Products, Inc.
16. Unimast, Inc.
17. United Construction Supply.
15. United States Steel.
19. Western Metal Lath Co.

2.2 MATERIALS

A. Galvanized-Steel Sheet: ASTM A 446 (ASTM A 446M), zinc coated according to ASTM A 525 (ASTM A 525M), and as follows:

1. Coating Designation: G 60 (Z 180).

A. 2. Grade: Anchor Bolts: ASTM F 1554, Grade [**36**] [**55**], threaded carbon-steel **hex-headed bolts** and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by **hot-dip process according to ASTM A 153/A 153M, Class C**.

2.3 WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs,of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm) (16 gauge)

3. Flange Width: 2-1/2 inches (63 mm).

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Minimum Base-Metal Thickness:0.0538 inch (1.37 mm.) (16 gauge)

2. Flange Width: Manufacturers standard deep flange where indicated, standard flange elsewhere.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges.

D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Gusset plates.
5. Deflection track and vertical slide clips.
6. Stud kickers and girts.
7. Joist hangers and end closures.
8. Reinforcement plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36 (ASTM A 36M), zinc coated by the hot-dip process according to ASTM A 123.

B. Cast-in-Place Anchor Bolts and Studs: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel hex-head bolts and studs; carbon-steel nuts; and flat, unhardened-steel washers. Zinc coated by the hot-dip process according to ASTM A 153.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and a 30-minute working time.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

3. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

C. Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed-on fireproofing is applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed-on fireproofing.

B. After sprayed-on fireproofing has been applied, remove only as much fireproofing as needed to complete installation of cold-formed framing without reducing thickness of fireproofing below that required to obtain fire-resistance rating indicated. Protect remaining fireproofing from damage.

C. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

D. Provide temporary bracing and leave in place until framing is permanently stabilized.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.

G. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 STEEL STUD WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings recommended by the manufacturer, but not greater than the following:

1 Spacing: 24 inches for nail or power-driven anchors.

2 Spacing: 32 inches for cast-in-place or expansion anchors.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

F. Install headers over wall openings wider than the stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated or required by manufacturer.

2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

G. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. Where type of supplementary support is not indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or load resulting from item supported.

H. Install horizontal bridging in stud system, spaced in rows not more than 48 inches (1219 mm) apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, clip angle fastened to webs of punched studs.

I. Install steel-sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom track. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace Work that does not comply with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05400

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 05 Section "Pipe and Tube Railings" for pipe and tube railings not attached to metal stairs or to walls adjacent to metal stairs.
3. Division 05 Section "Fabricated Metal Spiral Stairs."
4. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.
5. Division 09 Section "Non-Structural Metal Framing" for metal backing for anchoring railings.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch (6.4 mm), whichever is less.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

1.4 SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Prefilled metal-pan stair treads.
2. Nonslip aggregates and nonslip-aggregate finishes.
3. Abrasive nosings.
4. Metal floor plate treads.
5. Paint products.
6. Grout.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Qualification Data: For qualified testing agency.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs.

1. Test railings according ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 2 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

F. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

G. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.

H. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel, Type B, or structural steel, Grade 33 (Grade 230), unless another grade is required by design loads.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for **stairs indicated to be shop primed with zinc-rich primer**.

D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

E. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).

F. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

G. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa) unless otherwise indicated.

G. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

H. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" **for Type 2 welds: completely sanded joint, some undercutting and pinholes okay.**

2.6 STEEL-FRAMED STAIRS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alfab, Inc.
2. American Stair, Inc.
3. Sharon Companies Ltd. (The).

B. Stair Framing:

1. Fabricate stringers of steel plates or channels.

    a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than indicated.

1. Steel Sheet: Uncoated hot-rolled steel sheet.
2. Steel Sheet: Galvanized-steel sheet, where indicated.
3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.
5. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.7 STAIR RAILINGS

A. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay.

B. Form changes in direction of railings as follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.
3. By flush bends or by inserting prefabricated flush-elbow fittings.
4. By inserting prefabricated elbow fittings.

C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

D. Close exposed ends of railing members with prefabricated end fittings.

E. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
1. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

G. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:

1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING RAILINGS

A. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure

wall brackets to building construction as required to comply with performance requirements and as follows:

1. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

1. Apply finish paint system (intermediate and top-coat) as specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Stainless-steel pipe railings.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Stainless Steel: 60 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Concentrated load of 200 lbf applied in any direction.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Qualification Data: For qualified professional engineer.

D. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

E. Welding certificates.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor

bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Stainless-Steel Pipe and Tube Railings:

a. Blum, Julius & Co., Inc.
b. Paragon Aquatics; Division of Pentair, Inc.
c. Pisor Industries, Inc.
d. Stainless Fabricators, Inc.
e. Sterling Dula Architectural Products, Inc.; Div. of Kane Manufacturing.
f. Tri Tech, Inc.
g. Tubular Specialties Manufacturing, Inc.
h. Tuttle Railing Systems; Div. of Tuttle Aluminum & Bronze, Inc.
i. Wagner, R & B, Inc.; a division of the Wagner Companies.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

2.4 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 304.

B. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

C. Expanded Metal: ASTM F 1267, Type I (expanded), Class 3 (corrosion-resistant steel), made from stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304.

1. Style Designation: 1-1/2 number 10.

2.5 FASTENERS

A. General: Provide the following:

1. Stainless-Steel Railings: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form changes in direction as follows:

1. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STAINLESS-STEEL FINISHES

A. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Directional Satin Finish: No. 4.

C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or , mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and connected to railing ends using nonwelded connections.

B. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
    a. Provide weatherproof sealant as required on exterior walls to prevent water infiltration.

3.6 ADJUSTING AND CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

DIVISION 06 – WOOD AND PLASTICS

SECTION 061000 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking and nailers.
4. Wood furring.
5. Utility shelving.
6. Plywood backing panels.

B. Related Requirements:

1. Division 06 Section "Sheathing."
2. Division 06 finish carpentry Sections for nonstructural carpentry items exposed to view and not specified in another Section.
3. Division 31 Section "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber for exposed wood, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawl spaces or unexcavated areas.
5. Plywood roof, soffit, and sub-fascia panels that are installed under metal panel system.
6. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Application: Treat items indicated on Drawings, and the following:
1. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Miscellaneous Framing: No. 2 grade and any of the following species:

1. Southern pine; SPIB.
2. Douglas fir-larch; WCLIB or WWPA.
3. Spruce-pine-fir; NLGA.
4. Douglas fir-south; WWPA.
5. Douglas fir-larch (north); NLGA.
6. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.
5. Grounds.
6. Utility shelving.

B. For items of dimension lumber size, provide **Construction or No. 2** grade lumber [**of and any of the following species:**
1. Mixed southern pine; SPIB.
2. Western woods; WCLIB or WWPA.

C. For utility shelving, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 3 grade; SPIB.
2. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Cleveland Steel Specialty Co.

2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to vie**w.**

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.

I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size (19-by-38-mm actual-size) furring vertically at 16 inches (406 mm) o.c.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.
3. Building paper.
4. Flexible flashing at openings in sheathing.

B. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

6. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

B. Oriented Strand Board: DOC PS 2.

C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA C9.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood, unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA C27.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Use Exterior type for exterior locations and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat plywood indicated on Drawings, and the following:

1. Roof and wall sheathing within 48 inches (1220 mm) of fire walls.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.

1. Span Rating: Not less than 24/0.
2. Nominal Thickness: Not less than **3/4 inch (19 mm)**.

2.5 ROOF SHEATHING

A. Provide structural steel roof sheathing per structural specifications.

B. Plywood Roof Sheathing: **Exterior** sheathing.

1. Span Rating: Not less than **24/0**.
2. Nominal Thickness: Not less than 1/2 inch (13 mm).

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2. For roof sheathing, provide fasteners or fastening system per structural steel specifications.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.7 WEATHER-RESISTANT SHEATHING PAPER

A. Building Paper: ASTM D 226, Type I (No. 15 asphalt-saturated organic felt), unperforated.

2.8 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.040 inch (1.0 mm)**.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
c. MFM Building Products Corp.; Window Wrap.
d. Polyguard Products, Inc.; Polyguard 300.
e. Protecto Wrap Company; **BT-20 XL** or **PS-45**.
f. Tamko Building Products, Inc.;TW Moisture Wrap or TW Flash-N-Wrap 40.

2. Provide and install product recommended by manufacturer for substrate where installed.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing:
   a. Screw to cold-formed metal framing.
   b. Space panels 1/8 inch (3 mm) apart at edges and ends.

2. Roof Sheathing:
   a. Attach per structural specifications.
   b. Screw wood sheathing to structural metal deck.

3.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

A. General: Cover sheathing with weather-resistant sheathing paper as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.

B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

C. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.

2. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

SECTION 062614 - SOLID MINERAL PROFILE PANELING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Solid mineral profile paneling and seam finishing materials to create a monolithic sculptured wall surface.

B. Products Supplied But Not Installed/Used Under This Section: Following components of Installation Kit:
1. Dry Mix Joint Compound.
2. Acrylic Fortifier.
3. Low-VOC Adhesive.
4. Low- VOC Primer Sealer.
5. Countersink Drill Bit with Depth Stop-Collar.
6. Flexible Spreader(s).
7. Sandpaper.
8. Pre-measured Plastic Container.
9. Measuring Cup.

C. Related Sections:
1. 09 29 00–Gypsum Board: Substrate and seam finishing.
2. 09 91 23–Interior Painting: Sealing and painting of profile paneling.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM D 256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
2. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.
3. ASTM D 696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.
4. ASTM D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
5. ASTM D 2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Reference Section 01 33 00–Submittal Procedures; submit following items:
1. Product Data.
2. Project List: Minimum 5 previous completed projects including contact name and e-mail address or telephone number for each project.
3. Shop Drawings: Standard installation details.
4. Samples: Minimum 15 by 15 inch solid mineral panel of specified design(s).

5. Quality Assurance/Control Submittals:
   a. Qualifications: Proof of manufacturer, installer, and finisher qualifications.
   b. Manufacturer's Installation Instructions.

1.04 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: Minimum five years experience in producing mineral profile paneling.
   2. Installer Qualifications: Minimum three years experience in finish carpentry/architectural woodwork installation.

B. Field Samples: Provide in a location selected by Architect showing representative sample of installed product including finished seam.
   1. Reference Section 01 45 00–Quality Control.
   2. Minimum Size: 6 by 6 feet.
   3. Approved field samples may remain as part of completed Work.

C. Pre-Installation Meeting:
   1. Convene meeting at project site within one week of scheduled start of installation with representatives of the following in attendance: Owner, Architect, General Contractor, Installer, Finisher, and Painter.
   2. Review substrate conditions, requirements of related work, installation, seam finishing, and painting instructions, and storage and handling procedures.
   3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 016000–Product Requirements.

B. Follow manufacturer's instructions.
   1. Store panels in fully enclosed space, protected against damage from moisture, direct sunlight, and surface contamination.
   2. Store panels vertically, in shipping crates, until ready to be installed. Loosen crate lids to allow for venting. Do not stack or lean against walls.
   3. Store panels in area of installation minimum 24 hours prior to installation.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Requirements for Installation:
   1. HVAC: Operate HVAC system to maintain occupancy level temperature and relative humidity conditions (35 to 67 percent) in the area of installation from 24 hours prior to delivery of panels to the installation area through remainder of construction period.
   2. Lighting: Permanent project lighting, including any special lighting used to highlight the profiled panels, must be operational prior to seam finishing.

1.07 SEQUENCING

A. Seam Finishing: Depending on scheduling of other Work, seam finishing may be required after completion of other gypsum board finishing work.

B. Lighting: Permanent project lighting must be installed and be operational prior seam finishing.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Modular Arts, Inc.
4215 - 23rd Avenue West
Seattle, WA 98199

Tel: 206.788.4210
Fax: 206.788.4214
E-mail: info@modularArts.com
Website: www.modularArts.com

B. Product: Modular Arts Solid Mineral Profile Paneling.

1. Design: As indicated in the drawing finish schedule.

C. Substitutions: Request for substitutions will be considered in accordance with provisions of Section 016000.

2.02 MATERIALS

A. Profile Panel: 32 by 32 by 1 inch maximum profile relief, smooth surface solid mineral composite panel containing no retardants, accelerators, release agents, or plastics.
1. Physical Properties:
   a. Tensile Strength: ASTM D 638 960 psi.
   b. Modulus of Elasticity: ASTM D 638 1970 ksi.
   c. Flexural Strength: ASTM D 790 550 psi.
   d. Flexural Modulus: ASTM D 790 360 ksi.
   e. Izod Impact Strength: ASTM D 256 9.4 ft-lb/in^2.
   f. Hardness: ASTM D 2583 60 Barcol.
   g. Thermal Expansion: ASTM D 696 3.8x10^{-7}in/in °F.
   h. Compressive Strength: ASTM D 696 2.3 ksi.
   i. Flame Spread Index: ASTM E 84 0
   j. Smoke Development Index: ASTM E 84 0
   k. Weight 2.5 psf

B. Installation Kit: Item quantities in parenthesis denote quantities for (Large Kit—up to 100 panels).
1. Dry Mix Joint Compound: One 18 lb bag BEADEX® brand SILVER SET™ 40, or SHEETROCK® brand EASY SAND™ 45.
2. Acrylic Fortifier: (Two) quart THORO® ACRYL 60®.
3. Construction Adhesive: (16) 10.2 oz tubes PL® Polyurethane Premium Construction Adhesive.
4. Primer Sealer: (4) gal RODDA PAINT HORIZON Interior Wall Sealer No. 5035011.
5. Countersink Drill Bit with Depth Stop-Collar: (Two) No. 7.

6. Flexible Spreader: (Two) MUDTOOLS SMT-Y2
7. Sandpaper: (30) sheets No-Load 220G, (10/20) sheets No-Load 150G.
8. Plastic Container: One 100 oz.
9. Measuring Cup: One 8 oz.

2.03 ACCESSORIES

A. Anchors: 30 lb self-drilling, drywall anchor.

B. Screws: Coarse thread, drywall type, length as required by panel design and in accordance with Manufacturer's Installation Instructions.

2.04 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:
   1. Dimensions, length and width: +/- 1/16 inch.
   2. Thickness: +/- 1/16 inch.
   3. Weight: +/- 0.5 lb

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which profile paneling will be installed.
   1. Verify that substrate is a material listed as an acceptable substrate by the profile paneling manufacturer.

B. Verify that permanent project lighting is in place and operational prior to start of seam finishing.

C. Coordinate with responsible entity to correct unsatisfactory conditions.

D. Commencement of work by installer is acceptance of substrate conditions.

3.02 INSTALLATION

A. Install profile paneling in accordance with Manufacturer's Installation Instructions except that seam finishing shall be performed under Section 09 29 00–Gypsum Board, and sealing and painting shall be performed under Section 09 91 23–Interior Painting.

3.03 CLEANING

A. Reference Section 017700–Project Closeout.

END OF SECTION 062614

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior standing and running trim.
   2. Plastic-laminate cabinets.
   3. Plastic-laminate countertops.
   4. Shop finishing of interior woodwork.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated, including high-pressure decorative laminate, adhesive for bonding plastic laminate, cabinet hardware and accessories..

B. Product Data: For cabinet hardware and accessories.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Show pull/handle locations on all drawer or cabinet doors.

D. Samples for Initial Selection:
   1. Plastic laminates.

E. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of **AWI's** quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: Match existing wood species and grade where replacing existing trims to remain.

C. Wood Species for Opaque Finish: **Any closed-grain hardwood**.

D. Wood Products: Comply with the following:
   1. Hardboard: AHA A135.4.
   2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
   3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
      a. Manufacturer of product specified on drawings.
      b. Wilsonart International, Inc.
      c. Lamin-art, Inc.
      d. Formica

F. Adhesive for Bonding Plastic Laminate: contact cement.

1. Use manufacturer's recommended products.

2. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal of size and design indicated on drawings.

E. Catches: Push-in magnetic catches, BHMA A156.9, B03131.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081

G. Drawer Slides: BHMA A156.9, B05091.
1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted; full-extension type; zinc-plated steel with polymer rollers.
2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
3. Pencil Drawer Slides: **Grade 2**; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

H. Grommets for Cable Passage through Countertops: 2-inch Insert size OD, to be determined, molded-plastic grommets and matching plastic caps with slot for wire passage.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: BHMA 630.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 PLASTIC-LAMINATE CABINETS & SHELVES

A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.

B. Grade: Custom.

C. AWI Type of Cabinet Construction: Flush Overlay.

D. Laminate Cladding for Exposed Surfaces: Hihgh-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other than tops: HGL

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content. Certified Chain-of-Custody certificates clarifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body. Inlcude statement indicating costs for each certified wood product. .

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Custom.

B. Wood Species: Any closed-grain hardwood.

2.7 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: Grade HGS.

D. Materials for Semiexposed Surfaces:
1. Surfaces Other Than Drawer Bodies: Thermoset decorative overlay.
    a. Edges of Plastic-Laminate Shelves: PVC T-mold matching laminate in color, pattern, and finish.
    b. Thermoset decorative overlay and PVC to be selected by Architect from cabinet-work manufacturer's full range in the following categories
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

E. Drawer and door pulls: Provide drawer and door pulls on all cabinets unless otherwise indicated.
1. Confirm pull locations with Architect during shop drawing review.

F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. Basis of Design: Subject to compliance with requirements provide the following plastic laminate or a product of another manufacturer offering products of equivalent quality, design, and pattern, as judged solely by the Architect:
    a. As indicated on drawings Finish Schedule.
2. Install Plastic Laminate material per manufacturer’s recommendations using adhesives recommended by laminate manufacturer.

2.8 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Custom.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. Basis of Design: Subject to compliance with requirements provide the following plastic laminate or a product of another manufacturer offering products of equivalent quality, design, and pattern, as judged solely by the Architect:
      a. As indicated on drawings.
   2. Install Plastic Laminate material per manufacturer's recommendations using adhesives recommended by laminate manufacturer.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material: Exterior-grade plywood.

F. Paper Backing: Provide paper backing on underside of countertop substrate.

2.9 CLOSET AND UTILITY SHELVING

A. See Section 6 "Miscellaneous Rough Carpentry."

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.
   1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
   2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   1. Maintain veneer sequence matching of cabinets with transparent finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
   2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Cold-applied, emulsified-asphalt dampproofing.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ChemMasters Corp.
2. Degussa Building Systems; Sonneborn Brand Products.
3. Gardner Gibson, Inc.
4. Henry Company.
5. Karnak Corporation.
6. Koppers Inc.
7. Malarkey Roofing Products.
8. Meadows, W. R., Inc.
9. Tamms Industries, Inc.

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

E. VOC Content: Zero.

2.2 PROTECTION COURSE

A. Protection Course, Asphalt-Board Type: ASTM D 6506, premolded, 1/8-inch thick, multi-ply, semirigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

2.3 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

C. Patching Compound: Manufacturer's fibered mastic of type recommended by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Proceed with dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
2. Test for surface moisture according to ASTM D 4263.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or if required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
3. Allow 48 hours drying time prior to backfilling.

B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior.

1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing.
2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch wide strip of asphalt-coated glass fabric in a heavy coat

of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe, and lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

D. Apply dampproofing to provide continuous plane of protection on interior face of above-grade, exterior concrete walls unless walls are indicated to receive direct application of paint.

1. Continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by delaying construction of intersecting walls until dampproofing is applied.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Foundations: Apply 2 brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft., or 1 trowel coat at not less than 4 gal./100 sq. ft..

3.5 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course.

1. Support protection course with spot application of adhesive of type recommended by protection board manufacturer over cured coating.

3.6 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.
   2. Mineral-wool blanket insulation.

B. Related Sections:
   1. Division 07 Section “Metal Roof Panels” for insulation specified as part of roofing construction.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

   1. CertainTeed Corporation.
   2. Guardian Building Products, Inc.

3. Johns Manville.
4. Owens Corning.

B. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

2.2 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide Thermafiber SAFB or an equivalent product by one of the following manufacturer's:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 2.5 lb/cu. ft. or greater.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:

    a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.

C. Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For wood-framed construction, install blankets manufacturer’s recommendations for sound attenuation.

3.4 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.5 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 074113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.
2. Metal soffit panels.

B. Related Sections:

1. Division 05 Section "Steel Decking" for steel roof deck supporting metal roof panels.
2. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal roof panels.
3. Division 07 Section "Insulated Metal Fascia Panels " for manufactured f**asciae,** and other roof specialties not part of metal roof panel assemblies.
4. Division 07 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
   1. Test-Pressure Difference: Positive and negative **1.57 lbf/sq. ft. (75 Pa)**.
   2. Positive Preload Test-Pressure Difference: **Greater than or equal to 15.0 lbf/sq. ft. (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference**.
   3. Negative Preload Test-Pressure Difference: **50 percent of design wind-uplift-pressure difference**.

D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
   1. **20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12.0 lbf/sq. ft. (575 Pa)**
   2. Positive Preload Test-Pressure Difference: **Greater than or equal to 15.0 lbf/sq. ft. (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference**.
   3. Negative Preload Test-Pressure Difference: **50 percent of design wind-uplift-pressure difference**.

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

   1. Uplift Rating: **UL 90**.

G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

   1. Wind Loads: Determine loads based on the following minimum design wind pressures:

      a. Uniform pressure of **30 lbf/sq. ft. (1436 Pa),** acting inward or outward or as indicated on drawings.
      b. Roof design also to resist 130 m.p.h. winds per IBC 2006.
      c. Engineer to determine exposure level of the building per IBC 2006.
   2. Deflection Limits: Metal roof panel assemblies shall withstand wind and snow loads with vertical deflections no greater than **1/180** of the span.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): **120 deg F (67 deg C), ambient; 180 deg F (100 deg C)**, material surfaces.

I. Energy Performance: Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for roof products.

J. Energy Performance: Provide roof panels with initial solar reflectance not less than **0.70** and emissivity not less than **0.75** when tested according to CRRC-1.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):

a. Flashing and trim.
b. Gutters.
c. Downspouts.
d. Pipe/Vent Penetrations.

C. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof panels and attachments.
2. Purlins and rafters.
3. Insulated-Metal Fascia boards.
4. Roof Penetrations.

E. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

F. Qualification Data: For qualified Installer and testing agency.

G. Material Certificates: For thermal insulation and vapor retarders, from manufacturer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

I. Field quality-control reports.

J. Maintenance Data: For metal roof panels to include in maintenance manuals.

K. Warranties: Samples of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

D. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: **25** or less.
2. Smoke-Developed Index: **450** or less.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. Surface: **Smooth, flat** finish.
3. Exposed Coil-Coated Finish:

a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 FIELD-INSTALLED THERMAL INSULATION

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density unless otherwise indicated; with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
    b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.

1. Nominal Thickness: As required to meet performance requirements.

C. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.5 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; Cee-Lock standing seam or comparable product by one of the following:

    a. AEP-Span.
    b. ATAS International, Inc.
    c. Berridge Manufacturing Company.
    d. Butler Manufacturing; a BlueScope Steel company.
    e. CENTRIA Architectural Systems.
    f. Copper Sales, Inc.
    g. Flexospan Steel Buildings, Inc.
    h. MBCI; a division of NCI Building Systems, L. P.
    i. McElroy Metal, Inc.
    j. Merchant & Evans.
    k. Metal-Fab Manufacturing, LLC.
    l. Metal Sales Manufacturing Corporation.
    m. Petersen Aluminum Corporation.
    n. Steelox Systems, L.L.C.
    o. United Steel Deck Inc.; Subsidiary of Bouras Industries Inc.

2. Material: Aluminum-zinc alloy-coated steel sheet, 24 Guage nominal thickness.

a. Exterior Finish: 2-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

3. Batten: Same material, finish, and color as roof panels.
4. Clips: Fixed.

a. Material: 0.064-inch- (1.63-mm-) nominal thickness, aluminum-zinc alloy-coated steel sheet.

5. Joint Type: As standard with manufacturer.
6. Panel Coverage: 16 1/2 inches (419 mm).
7. Panel Height: 1.5 inches (38 mm).

2.7 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners **and factory-applied sealant** in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof panels.

1. Finish: Match finish and color of metal roof panels.
2. Sealant: Factory applied within interlocking joint.

C. Flush-Profile Metal Soffit Panels: Perforated panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge; soffit panel or comparable product by one of the following:

a. AEP-Span.
b. Architectural Building Components.
c. ATAS International, Inc.
d. Berridge Manufacturing Company.
e. CENTRIA Architectural Systems.
f. Copper Sales, Inc.
g. Dimensional Metals, Inc.
h. Englert, Inc.
i. Fabral.
j. IMETCO.
k. MBCI; a division of NCI Building Systems, L. P.
l. McElroy Metal, Inc.
m. Merchant & Evans.
n. Metal-Fab Manufacturing, LLC.
o. Metal Sales Manufacturing Corporation.
p. Petersen Aluminum Corporation.
q. Ultra Seam Incorporated.

2. Material: Same material, finish, and color as metal roof panels.

3. Material: Aluminum-zinc alloy-coated steel sheet, 24 Guage nominal thickness.

   a. Exterior Finish: 2-coat fluoropolymer.
   b. Color: As selected by Architect from manufacturer's full range.

4. Panel Coverage: **16 inches (406 mm)**.
5. Panel Height: **1.5 inches (38 mm)**.
6. Sealant: Factory applied within interlocking joint.

2.8 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
   2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
   3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum **0.018 inch (0.45 mm)** thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

D. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Finish downspouts to match gutters.

2.9 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.10 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Roof perimeter for a distance up from eaves of **36 inches (914 mm)** beyond interior wall line.
2. Rake edges for a distance of **18 inches (460 mm)**.
3. Hips and ridges for a distance on each side of **12 inches (300 mm)**.
4. Roof to wall intersections for a distance from wall of **18 inches (460 mm)**.
5. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of **18 inches (460 mm)**.

B. Felt Underlayment: Apply at locations indicated below, in shingle fashion to shed water, and with lapped joints of not less than 2 inches (50 mm).

1. Apply over entire roof surface.
2. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 3 inches (75 mm), in shingle fashion to shed water.

C. Apply slip sheet over underlayment before installing metal roof panels.

D. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 THERMAL INSULATION INSTALLATION

A. Polyethylene Vapor Retarder: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Repair tears or punctures immediately before concealment by other work.

B. Board Insulation: Extend insulation in thickness indicated to cover entire roof. Comply with installation requirements in Division 07 Section "Thermal Insulation."

1. Erect insulation and hold in place with Z-shaped furring members spaced **24 inches (610 mm)** o.c. Securely attach narrow flanges of furring members to roof deck with screws spaced 24 inches (600 mm) o.c.

3.5 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Point of Fixity: Fasten each panel along a single line of fixing located at **ridge**.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:

1. Commence metal roof panel installation and install minimum of **300 sq. ft. (27.8 sq. m.)** in presence of factory-authorized representative.
2. Field cutting of metal panels by torch is not permitted.
3. Install panels perpendicular to purlins.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Provide metal closures at rake edges, rake walls, and each side of ridge caps.
6. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
7. Install ridge caps as metal roof panel work proceeds.
8. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
9. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.6 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.7 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.

B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

C. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.8 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

F. Reglet and counterflashing installation: Coordinate installation of reglets and counterflashings with installation of base flashings.

1. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant. Fit counterflashings tightly to base flashings.

3.9 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 074216 - INSULATED-CORE METAL FASCIA PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Foamed-insulation-core metal wall panels.

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal wall panels.

1.3 DEFINITIONS

A. Metal Wall Panel Assembly: Insulated-core metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)**.

C. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than **6.24 lbf/sq. ft. (299 Pa)** and not more than 12 lbf/sq. ft. (575 Pa).

1. Water Leakage: As defined according to AAMA 501.1.

D. Structural Performance: Metal wall panel assemblies shall withstand the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

   a. Uniform pressure of **30 lbf/sq. ft. (1436 Pa)**, acting inward or outward.
   b. Uniform pressure as indicated on Drawings.

2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than **1/240** of the span.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): **120 deg F (67 deg C), ambient; 180 deg F (100 deg C)** , material surfaces.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop-, and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):

   a. Flashing and trim.
   b. Anchorage systems.

C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Coordination Drawings: Exterior elevations, drawn to scale, and coordinating penetrations and wall-mounted items. Show the following:

1. Wall panels and attachments.
2. **Girts** and **Stud framing**.

F. Qualification Data: For **Installer**, **professional engineer and testing agency**.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

H. Field quality-control reports.

I. Maintenance Data: For insulated-core metal wall panels to include in maintenance manuals.

J. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal wall panel from single source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
1. Surface-Burning Characteristics: Provide wall panels with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with

positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panels for period of metal wall panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of **girts, studs,** soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: **Two** years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
2. Surface: **Smooth, flat** finish.
3. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.

2.2 INSULATION FOR PANEL CORES

A. Polyisocyanurate Insulation: Closed cell, modified polyisocyanurate foam using a non-CFC blowing agent, **foamed-in-place** type, with maximum flame-spread index of 25 and smoke-developed index of 450.

1. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

2.3 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, **ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized**, or coating with equivalent corrosion resistance unless otherwise indicated.

B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.064-inch (1.63-mm) nominal thickness.

C. Zee Clips: 0.079-inch (2.01-mm) nominal thickness.

D. Cold-Rolled Furring Channels: Minimum 1/2-inch- (13-mm-) wide flange.

1. Nominal Thickness: **As required to meet performance requirements**.
2. Depth: **As indicated**.
3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with 0.040-inch (1.02-mm) nominal thickness.

E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.4 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws; bolts and nuts; self-locking rivets and bolts; end-welded studs; and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.5 FOAMED-INSULATION-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

1. Panel Performance:

a. Flatwise Tensile Strength: 30 psi (207 kPa) when tested according to ASTM C 297.
b. Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for 7 days at 140 deg F (60 deg C) and 100 percent relative humidity according to ASTM D 2126.
c. Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at 200 deg F (93 deg C) according to ASTM D 2126.

d. Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a 20-lbf/sq. ft. (958-kPa) positive and negative wind load and with deflection of L/180 for 2 million cycles.
e. Autoclave: No delamination when exposed to 2-psi (13.8-kPa) pressure at a temperature of 212 deg F (100 deg C) for 2-1/2 hours.

2. Polyisocyanurate Insulation-Core Performance:

a. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D 1622.
b. Compressive Strength: Minimum 20 psi (138 kPa) when tested according to ASTM D 1621.
c. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C 273.

B. Concealed-Fastener, Foamed-Insulation-Core Metal Fascia (Wall) Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Insulated Panel Systems, Div. of NCI Building Systems; Designer Series Panels or comparable product by one of the following:

a. CENTRIA Architectural Systems;
b. Insulated Panel Systems, Div. of NCI Building Systems;
c. Metl-Span;
d. Steelox Systems, L.L.C.; TW-100 Wall Panel.

2. Facings: Fabricate panel with exterior and interior facings of same material and thickness.

a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
c. Backer Board: On back side of exterior facing.
d. Exterior Facing Finish: 3-coat fluoropolymer.

1) Color: **As selected by Architect from manufacturer's full range**] <**Insert color**.

e. Interior Facing Finish: Manufacturer's standard siliconized polyester.
f. Exterior Surface: **Smooth, flat**.

3. Panel Coverage: **36 inches (914 mm)** nominal or as indicated in drawings.
4. Panel Thickness: Nominal **2.0 inches (51 mm)**.

2.6 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Closures: Provide closures at base and edge of fascia, fabricated of same metal as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.018-inch- (0.46-mm-) minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.7 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Commence metal wall panel installation and install minimum of **300 sq. ft. (27.9 sq. m.)** in presence of factory-authorized representative.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. Flash and seal metal wall panels with weather closures at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
4. Install screw fasteners in predrilled holes.
5. Locate and space fastenings in uniform vertical and horizontal alignment.
6. Install flashing and trim as metal wall panel work proceeds.
7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.4 INSULATED-CORE METAL WALL PANEL INSTALLATION

A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated-core metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.

1. Fasten insulated-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
2. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
5. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.

B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.

1. Install clips to supports with self-tapping fasteners.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated.

Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

A. Testing Agency: **Engage** a qualified testing agency to perform tests and inspections.

B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft. (299 Pa).

C. Water-Spray Test: After completing the installation of 75-foot- (23-m-) by-2-story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.

D. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.

E. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074216

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.

B. Related Sections:

1. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

C. Firestopping Schedule: Submit a schedule containing the each penetration requiring firestopping, referencing its location, type of penetration and firestopping system proposed to maintain fire rating.
1. Indicated UL-classified systems are indicated, refering to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johns Manville.
2. RectorSeal Corporation.
3. 3M Fire Protection Products.
4. Tremco, Inc.; Tremco Fire Protection Systems Group.
5. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and

maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

C. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-wool-fiber or rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

B. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Polysulfide joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers **eight** samples of materials that will contact or affect joint sealants. Use **ASTM C 1087** or **manufacturer's standard test method** to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

C. Samples: For each kind and color of joint sealant required.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

E. Product test reports.

F. Preconstruction compatibility and adhesion test reports.

G. Preconstruction field-adhesion test reports.

H. Field-adhesion test reports.

I. Warranties.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS (SJS-01)

A. Neutral-Curing Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Dow Corning Corporation.
    c. GE Advanced Materials - Silicones.
    d. May National Associates, Inc.
    e. Pecora Corporation.
    f. Polymeric Systems, Inc.
    g. Schnee-Morehead, Inc.
    h. Sika Corporation; Construction Products Division.
    i. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Nontraffic (NT).

2.3 SILICONE JOINT SEALANTS (SJS-02)

A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Dow Corning Corporation.
    c. GE Advanced Materials - Silicones.
    d. May National Associates, Inc.
    e. Pecora Corporation.
    f. Polymeric Systems, Inc.
    g. Schnee-Morehead, Inc.
    h. Sika Corporation; Construction Products Division.
    i. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: nonsag (NS).
4. Class: 25.
5. Uses Related to Exposure: Nontraffic (NT).
6. At moisture areas in toilets, sinks in countertops and at junction of CMU cove base units with flooring materials.

2.4 POLYSULFIDE JOINT SEALANTS

A. Multicomponent, Pourable, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bostic; Chem-Calk 250.
   b. Pacific Polymers International, Inc.; Elastoseal 227 Type I.
   c. W. R. Meadows, Inc.; Deck-O-Seal 125 to Deck-O-Seal 150.

2.5 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. BASF Building Systems.
   b. Bostik, Inc.
   c. DAP.
   d. May National Associates, Inc.
   e. Pecora Corporation.
   f. Schnee-Morehead, Inc.
   g. Tremco Incorporated.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Dow Chemicals.
   b. Pecora Corporation.
   c. USG Corporation.

2.7 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first **1000 feet (300 m)** of joint length for each kind of sealant and joint substrate.
b. Perform 1 test for each **1000 feet (300 m)** of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces[<**JS-#**>].

1. Joint Locations:
   a. Horizontal paving joints.
   b. Other joints as indicated.

2. Joint Sealant: Polysulfide.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

   a. Construction joints in cast-in-place concrete.
   b. Joints between plant-precast architectural concrete units.
   c. Control and expansion joints in unit masonry.
   d. Joints between metal panels.
   e. Joints between different materials listed above.
   f. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
   g. Control and expansion joints in ceilings and other overhead surfaces.
   h. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SJS-01
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Tile control and expansion joints.
    d. Vertical joints on exposed surfaces of walls and partitions.
    e. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
    f. Other joints as indicated.

2. Joint Sealant: Latex.
3. As selected by Architect from manufacturer's full range of color.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

    a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    b. Tile control and expansion joints where indicated.
    c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SJS-02
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

    a. Acoustical joints where indicated.
    b. Other joints as indicated.

2. Joint Sealant: Acoustical.

END OF SECTION 079200

DIVISION 08 – DOOR AND WINDOWS

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections:
1. Division 08 Section “Door hardware.” for door hardware for hollow metal doors.
2. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

C. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.

6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-(102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Deansteel Manufacturing Company, Inc.
6. Firedoor Corporation.
7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **A40 (ZF120)**] [**G60 (Z180) or A60 (ZF180)** metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush Panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

    a. Fire Door Core: As required to provide fire-protectionratings indicated.
    b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than **6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W)** when tested according to ASTM C 1363.

        1) Locations: Exterior doors.

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.

    a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in **SDI 117**.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) high.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by

primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

2.9 Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

SECTION 081213 – INTERIOR ALUMINUM DOOR FRAMES AND OFFICEFRONT FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Aluminum door frames for interior use.
2. Aluminum window frames for interior use; “Officefront” frames.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, factory finish, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
3. Locations of reinforcement and preparations for hardware.
4. Details of each different wall opening condition including masonry openings.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.

C. Samples for Initial Selection: For systems other than the basis of design product, provide 6” long section of each profile type used with stops, for profile verification with factory applied anodized finish, for verification of design intent.

D. Other Action Submittals:

1. Schedule: Provide a schedule of aluminum metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.4 QUALITY ASSURANCE

A. Source Limitations: Provide interior aluminum frames and accessories produced by a single manufacturer for each type of product indicated.

B. Manufacturer's Qualifications: Manufacturer shall demonstrate previous experience in manufacturing of interior aluminum door and OfficeFronts framing for a period of not less than 10 years on comparable sized project.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252.
1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Inspect frames and doors upon delivery for damage.

1. Repair minor damage to pre-finished products by means as recommended by manufacturer.
2. Replace frames and doors that cannot be satisfactorily repaired.

C. Store aluminum frame work under cover at Project site and as near as possible to final installation location. Do not use covering material that will cause discoloration of aluminum finish.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for aluminum frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 EXTRUDED ALUMINUM INTERIOR DOOR FRAMES

A. Basis-of-Design Product: Subject to compliance with requirements, provide RACO Interior Products, Inc.; Classic prestige Fixed Throat Frames or comparable product by one of the following:

a. CMI Architectural
b. Commercial Architectural Products, Inc.
c. EFCO Corporation.
d. Kawneer North America; an Alcoa company.
e. Leed Himmel Industries, Inc.
f. Pittco Architectural Metals, Inc.
g. Tubelite.
h. United States Aluminum.
i. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

B. Fixed throat frames to accommodate wall thicknesses indicated on Drawings.

1. Ceiling heights indicated on drawings.

2.2 FIRE RATED EXTRUDED ALUMINUM INTERIOR DOOR FRAMES

A. Basis-of-Design Product: Subject to compliance with requirements, provide RACO Interior Products, Inc.; Classic Freestanding Fixed Throat Frames or comparable product by one of the following:

a. CMI Architectural
b. Commercial Architectural Products, Inc.
c. EFCO Corporation.
d. Kawneer North America; an Alcoa company.
e. Leed Himmel Industries, Inc.

f. Pittco Architectural Metals, Inc.
g. Tubelite.
h. United States Aluminum.
i. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

B. Provide fire rated frames to 90 minute rating complying with UL 10B, ASTM E 152, and NFPA 252.

C. Fixed throat frames to accommodate wall thicknesses indicated on Drawings.

1. Ceiling heights indicated on drawings.

2.3 EXTRUDED ALUMINUM INTERIOR BORROWED LIGHT FRAMES

A. Basis-of-Design Product: Subject to compliance with requirements, provide RACO Interior Products, Inc.; Classic Prestige Fixed Throat Frames or comparable product by one of the following:

a. CMI Architectural
b. Commercial Architectural Products, Inc.
c. EFCO Corporation.
d. Kawneer North America; an Alcoa company.
e. Leed Himmel Industries, Inc.
f. Pittco Architectural Metals, Inc.
g. Tubelite.
h. United States Aluminum.
i. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

B. Fixed throat frames to accommodate wall thicknesses indicated on Drawings.

1. Ceiling heights indicated on drawings.

2.4 MATERIALS

A. Aluminum: Meeting requirements of ASTM B221, 6063T5 alloy, and as otherwise required to assure compliance with dimensional tolerances and maintain color uniformity. Billets shall be composed of at least 25% recycled aluminum.

B. Anchorage Devices, Clips and Fasteners: Manufacturer's standard type, compatible with materials being secured.

C. Accessories: As necessary for complete system.

D. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

1. Provide grout per extruded aluminum frame Manufacturer's written specifications only as required to provide UL listed fire rating.

E. Glazing: Comply with requirements in Division 08 Section "Glazing."

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 FRAME ANCHORS

A. Anchorage Devices, Clips and Fasteners:

1. Manufacturer's standard type, compatible with materials being secured.

B. Accessories: As necessary for complete system.

2.6 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Manufacturer's standard for framing system.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.8 FABRICATION

A. Assemble all sidelights and windows with the use of clips.

B. Do not exceed maximum size of window or door to meet applicable code requirements.

C. Factory pre-machine door frame jambs and prepare for hardware, with concealed reinforcement plates, drilled and tapped as required, and fastened within frame with concealed screws.

D. Fabricate extruded aluminum to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

E. Extruded Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Each jamb frame or head jamb should be from factory milled lengths to span full height or width of the assembly.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
3. Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
5. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted per manufacturer's recommendations for fire rating.
6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
        1) Per manufacturer's direction.

    b. Compression Type: Not less than two anchors in each jamb.
    c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

F. Hardware Preparation: Factory prepare extruded aluminum work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Reinforce frames to receive nontemplated, mortised and surface-mounted door hardware per manufacturer's specifications.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Provide loose stops and moldings on inside of hollow metal work.
2. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 FINISHES:

1. Factory finish extruded frame and door components so that all parts exposed to view upon completion of installation are uniform in finish and color. Exposed surfaces shall be free of scratches and other serious blemishes.
2. Clear Anodized: AA-M12C22A21, etched, medium matte, clear anodic coating.

3. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Verify wall thicknesses do not exceed manufacturer’s recommended tolerance for specified throat size.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install extruded aluminum work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

1. Comply with frame and door manufacturer's printed installation instructions and approved shop drawings.
2. Do not attempt installation in areas where wall thickness exceeds tolerances of specified throat size.

B. Install frames plumb and square, free from warp or twist, securely anchored to substrates with fasteners recommended by frame manufacturer.

C. Maintain dimensional tolerances and alignment with adjacent work. Ensure joints are hairline tight and surfaces flush with adjacent components.

D. Set all doors in correct locations as shown on the drawings, level, square, plumb and in alignment with other work in accordance with the manufacturer's installation instructions and approved shop drawings.

E. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

    a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
    b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

F. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with extruded aluminum manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Protect exposed protions of aluminum surfaces from damage by plater, lime ,acid, cement or other contaminants.

C. Remove grout and other bonding material from extruded aluminum work immediately after installation.

D. Touch up marred areas so that touch-up is not visible from a distance of 4 feet. Remove and replace frames that cannot be satisfactorily adjusted.

3.5 PROTECTION

A. Protect as require dot assure that frames and doors will be without damage until substantial completion.

END OF SECTION 081213

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

E. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in **plastic bags or cardboard cartons**.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between **43 and 70** percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Algoma Hardwoods, Inc.
2. Ampco, Inc.
3. Buell Door Company Inc.
4. Chappell Door Co.
5. Eagle Plywood & Door Manufacturing, Inc.
6. Eggers Industries.
7. Graham; an Assa Abloy Group company.
8. Haley Brothers, Inc.
9. Ideal Architectural Doors & Plywood.
10. Ipik Door Company.
11. Lambton Doors.
12. Marlite.
13. Marshfield Door Systems, Inc.
14. Mohawk Flush Doors, Inc.; a Masonite company.
15. Oshkosh Architectural Door Company.
16. Poncraft Door Company.
17. Vancouver Door Company.
18. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: public toilets, assembly spaces, and exits.

C. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf (3100 N).
b. Screw Withdrawal, Edge: 400 lbf (1780 N).

D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

E. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: Match species, grain, and color as indicated in drawings.
3. Match between Veneer Leaves: Slip match.
4. Assembly of Veneer Leaves on Door Faces: Running match.
5. Pair and Set Match: Provide for doors hung in same opening.
6. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet (6 m) or more.
7. Exposed Vertical **and Top** Edges: **Same species as faces or a compatible species**.
8. Core: Either glued wood stave or structural composite lumber.
9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI catalyzed polyurethane system.
3. Staining: Match Architect's sample.
4. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for punched openings.
3. Manual-swing entrance doors.

B. Related Sections:

1. Division 8 Section "Door Hardware" for door hardware.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

B. For operable window vent systems, performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:

1. AW: Architectural.
2. HC: Heavy Commercial.
3. C: Commercial.
4. LC: Light Commercial.
5. R: Residential.

C. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:

1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

D. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

E. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

    a. Deflection exceeding specified limits.
    b. Thermal stresses transferring to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    d. Noise or vibration created by wind and by thermal and structural movements.
    e. Loosening or weakening of fasteners, attachments, and other components.
    f. Sealant failure.
    g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads: **As indicated on Drawings**.

    a. Basic Wind Speed: **130 mph (58 m/s) minimum**.
    b. Importance Factor: 1.0.
    c. Exposure Category: **B**.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.

G. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft_2 at a static air pressure differential of 6.24 psf.

H. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 12 psf as defined in AAMA 501.

I. Uniform Load: A static air design load of 86 psf with steel reinforcing (+60 / -65 psf without steel reinforcing) shall be applied in the positive and negative direction in accordance with DCBCCO Protocol PA 202 and ASTM E 330. There shall be no deflection in excess of l/180 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.4% of their clear spans shall occur.

J. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

2. Include details of joining of the operable vent window system with the storefront system.
3. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.
3. Include provisions for inclusion for the operable window vent system.

F. Qualification Data: For qualified Installer.

G. Preconstruction Test Reports: For sealant.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

I. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

J. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
2. Manufacturer Qualifications: Manufacturer capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.

B. Source limitations: Provide aluminum storefront system and operable window vent system from a single manufacturer to ensure compatability.

C. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

H. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer's Warranty: Submit, for the Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the Owner may have under Contract Documents.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water leakage through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product for exterior storefront: Subject to compliance with requirements “IR501 with 350IR doors” by Kawneer North America; an Alcoa company or comparable product by one of the following:

1. Kawneer North America; an Alcoa company.
2. Pittco Architectural Metals, Inc.
3. United States Aluminum.
4. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

B. Basis-of-Design Product for operable window vents: Subject to compliance with requirements, provide Kawneer; AA 900 ISOWEB Awning style windows or a comparable product by one of the following:

1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
2. Boyd Aluminum Manufacturing.
3. Custom Window Company.
4. DeSCo Windows.
5. EFCO Corporation.
6. EXTECH Exterior Technologies, Inc.
7. Fleetwood Aluminum Products, Inc.
8. Gerkin Windows and Doors.
9. Graham Architectural Products Corp.
10. Kawneer; an Alcoa; AA 900 ISOWEB Window Company.
11. Mannix; a division of Interstate Window Corp.
12. Peerless Products Inc.
13. Thermal Windows, Inc.
14. TRACO.

15. Wausau Window and Wall Systems.
16. Winco Window Company.
17. Window Technologies, Inc.; Century Manufacturing, Inc.
18. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Nonthermal.
2. Framing Member Profile: 2-1/2" x 5" nominal dimension; Center Glazed; Interior Structural Silicone Glazed; Screw Spline Fabrication.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."
   a. Provide insulated missile resistant glazing for fixed storefront panels.
   b. Provide monolithic laminated glazing, minimum for operable window vents.
   c. Provide glazing as specifically specified by manufacturer in their product test results showing compliance with windborne-debris-impact-resistance performance test.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealant System: Per window and storefront manufacturer’s specifications as indicated in test results showing that the systems pass the missile resistance test.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

   1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

   2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.

      a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

   3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

      a. Provide nonremovable glazing stops on outside of door.

B. Entrance Door Hardware: As specified in Division 8 Section "Door Hardware."

2.6 VENT WINDOW

A. Window Type: Project-Out Awning.

B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.

1. Performance Class and Grade: Heavy Commercial Grade AC-HC90/AP-AW90.

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 64 for frame.

D. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum when tested according to AAMA 1503.

1. U-Factor: 0.43 Btu/sq. ft. x h x deg F (2.5 W/sq. m x K) or less.

E. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.

1. Maximum Rate: 0.1 cfm/sq. ft. (2 cu. m/h x sq. m) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa).

F. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.

1. Test Pressure: 20 percent of positive design pressure, but not more than 15 lbf/sq. ft. (720 Pa).

G. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.

H. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

C.

2.8 HARDWARE FOR OPERABLE WINDOW VENTS

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant

material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide manufacturer's standard extruded, cast, or wrought aluminum or nonmagnetic stainless steel.

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.

D. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

E. Projected Awning Windows: Provide the following operating hardware:

1. Operator: Gear-type rotary operator located on jamb at sill.

   a. Handle: Standard crank.
2. Hinge: Concealed four- or six-bar friction hinge located on each jamb near top rail; two per ventilator.
3. Lock: Lift-type throw, cam-action lock with keeper; **two** per ventilator.

2.9 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on inside of window and provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Monumental-M-32 class.

B. Glass-Fiber Mesh Fabric: Manufacturer's standard mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656.

1. Mesh Color: **Charcoal gray**.

2.10 FABRICATION FOR STOREFRONT AND DOOR ASSEMBLIES

A. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Form or extrude aluminum shapes before finishing.

E. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 VENTILATOR FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows into storefront system.

B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
   1. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Subframes: Provide subframes reinforcement of storefront system as required by manufacturer for vent window installation. Delete paragraph below if not applicable.

G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.13 ALUMINUM FINISHES

A. Clear Anodic Finish: Manufacturer’s standard, AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with Shop Drawings and manufacturer's written instructions and AAMA storefront and entrance guide specifications manual.

1. Do not install damaged components.
2. Fit joints to produce hairline joints free of burrs and distortion.
3. Rigidly secure nonmovement joints.
4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
5. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 8 Section "Glazing."

1. Structural-Sealant Glazing:

a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
b. Install weatherseal sealant according to Division 7 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce

weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

c. Reference: Ansi Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

I. Set window sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

J. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

K. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" to produce weathertight installation.

3.3 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.

1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
   a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft^2, whichever is greater.
   b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf (300 Pa).

B. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 ADJUSTING

A. Adjust operable window vent and entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

3.5 ENTRANCE DOOR HARDWARE SETS

A. See Section 08710 – Door Hardware.

END OF SECTION 084113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fixed and operable aluminum-framed windows for exterior locations.

B. Related Sections include the following:

1. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units and vent lites in storefront systems.

1.3 DEFINITIONS

A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:

1. AW: Architectural.
2. HC: Heavy Commercial.
3. C: Commercial.
4. LC: Light Commercial.

B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:

1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:
   1. Size indicated on Drawings in a schedule.

B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

   1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

      a. Basic Wind Speed: 130 mph.
      b. Importance Factor: 1.0.
      c. Exposure Category: **B**.

   2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

C. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Thermal-break details.
7. Glazing details.
8. Window cleaning provisions.
9. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of aluminum windows and used to determine the following:

    a. Structural test pressures and design pressures from wind loads indicated.
    b. Deflection limitations of glass framing systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.

D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

E. Qualification Data: For **Installer**, **manufacturer and testing agency**.

F. Field quality-control test reports.

G. Product Test Reports: Based on evaluation of comprehensive tests performed within the last five years by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

H. Maintenance Data: For operable window sash and finishes to include in maintenance manuals.

I. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of data for aluminum windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
c. Faulty operation of movable sash and hardware.
d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: Two years from date of Substantial Completion.

b. Glazing: **10** years from date of Substantial Completion.
c. Metal Finish: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer**;** Sealair 8400TL windows or a comparable product by one of the following:

1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
2. Custom Window Company.
3. DeSCo Windows.
4. EFCO Corporation.
5. EXTECH Exterior Technologies, Inc.
6. Gerkin Windows and Doors.
7. Graham Architectural Products Corp.
8. Kawneer; an Alcoa Company.
9. Mannix; a division of Interstate Window Corp.
10. Peerless Products Inc.
11. Thermal Windows, Inc.
12. TRACO.
13. Wausau Window and Wall Systems.
14. Winco Window Company.
15. Window Technologies, Inc.; Century Manufacturing, Inc.
16. YKK AP America Inc.

B. Window Types: Provide two sash horizontal slider units, three sash horizontal slider units or fixed sash slider units as indicated in drawings from the product line selected.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.

2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
1. Coordinate with Manufacturer's specifications to maintain hurricane resistance requirements.
2. Where steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.

F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

G. Replaceable Weather Seals: Comply with AAMA 701/702.

H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

2.4 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash or ventilator weight

and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide manufacturer's standard corrosion resistant hardware material compatible with aluminum.

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Roller Assemblies: Low-friction design.

D. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.

E. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

F. Horizontal-Sliding Windows: Provide the following operating hardware:

1. Sash Rollers: Stainless-steel, lubricated ball-bearing rollers with nylon tires.
2. Sash Lock: Spring-loaded plunger lock with keeper on meeting rail; two per sash.
3. Limit Device: Sash stop limit device; mounted in bottom of pull stile.

2.5 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on inside of window and provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Architectural C-24 class.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Finish: Match aluminum window members.

A. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

B. Spline shall be extruded vinyl, removable to permit rescreening.

C. Wickets: Provide wickets, framed and trimmed for a tight fit and for durability during handling.

2.6 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

1. Horizontal-Sliding Windows: Provide operable sash with a double row of sliding weather stripping in horizontal rails and single- or double-row weather stripping in meeting or jamb stiles, as required to meet specified performance requirements. Provide compression-type weather stripping at perimeter of each movable panel where sliding-type weather stripping is not appropriate.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
   1. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 085113

SECTION 087100 – DOOR HARDWARE

PART - 1 - GENERAL

1.01 - SUMMARY.

A. SECTION INCLUDES:

Furnish the General Contractor with all finish hardware as required and specified herein.
These specifications are a guide and description of the type and quality of materials required.
Materials of quality less than outlined by these specifications will not be accepted.
If there are any discrepancies or omissions noted in any hardware set, call them to the attention
of the Architect prior to the bid opening for instructions; otherwise, the list will be considered
complete. Any additional items which may be required will be of the same type, quality and be consistent with other hardware specified.

B. RELATED DOCUMENTS:

Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 of the specifications, apply to this section.

C. RELATED DIVISIONS AND SECTIONS:

Coordinate with the following the following sections for the installation of finish hardware:
Division 8, Section for metal doors and frames.
Division 8, Section for wood doors.
Division 8, Section for alum. doors and frames.

1.02 - REFERENCES.

A. CODE DOCUMENTS AND INSTITUTES:

NFPA 80: Standards for fire doors. 1999 Edition
NFPA 101: Life safety codes. 1997 Edition
NFPA105: Smoke and draft control for door assemblies.
ANSI A117.1: Standards for accessibility by the physically handicapped. 1998 Edition
ANSI A156.1 thru A156.21: Standards for finish hardware
SBCCI: Southern Building Code Congress International.
ADA: American with Disabilities Act.

1.03 - SUBMITTALS.

A. GENERAL REQUIREMENTS.
Make all submittals in accordance with SECTION 01300, Division 1

B. FINISH HARDWARE SCHEDULE:

Submit six (6) copies for approval, following the sequence and format as recommended by the Door and Hardware Institute.
The schedule shall include the manufacturers name, model description, finish, and fasteners for each item of hardware. Include proper size for door closers, hand of all handed hardware, and all other information for the installer to properly install and adjust all hardware.
Schedule shall also give a complete description of the opening, including degree of swing, hand, door size, label information, stile sizes, glass size, etc

C. PRODUCT DATA:

Submit three (3) copies with the finish hardware schedule, showing the grade, design , and function of all hardware to be used on this project.

D. SAMPLES.

Furnish samples if requested by the Architect.
All samples shall be returned to the hardware supplier, and if approved by the Architect may be used on the project.

E. TEMPLETS.

Templets shall be furnished to each fabricator of doors, frames and other related trades for proper coordination of fabrication.

F. KEYING SCHEDULE.

The schedule shall be indexed by door number, key set and hardware schedule heading number.
The schedule shall include all special keying notes and stamping instructions.
Furnish three (3) copies for approval.

G. WIRING DIAGRAMS.

Furnish three (3) copies of a wiring diagram for each electrical hardware product used on the project. Show elevations, and a description of how the hardware will operate.

H. OPERATIONS AND MAINTENANCE DATA.
Furnish the owner with three copies of maintenance manuals for each hardware product used on the project showing warranties, and servicing of products. All information shall be supplied in a three ring binder. Furnish (3) three for this project.

1.04 - QUALITY ASSURANCE.

A. SUBSTITUTIONS.

Manufacturers listed in these specifications are to establish a standard of quality required for this project.
Similar items from other manufacturers may be accepted upon approval by the Architect, providing the request is received ten (10) days prior to bid date.
All request shall include complete product data, and will be approved by addendum as per Division 1 Section 1600.

B. SUPPLIER QUALIFICATIONS.

The supplier shall have been furnishing finish hardware for similar projects in the vicinity for not less than five years.
The supplier must be a factory authorized distributor of all materials proposed to be furnished on this project.
The supplier shall have an office and warehouse within a seventy five (75) mile radius of the project to properly service the project, and be available to make job site visits when requested by the Architect or Contractor within a reasonable amount of time.

1.05 - DELIVERY, STORAGE AND HANDLING.

A. MARKING AND PACKAGING.

The supplier shall mark each item of hardware with a sticker that identifies the door as listed in the approved finish hardware schedule showing all the information including the heading, location of door, degree of swing, hand, size of door, type of door / frame, and any keying information.

B. DELIVERY.

The supplier shall deliver all hardware to the project in manufacturer's original packages. All hardware shall be delivered in a timely manner so an not to delay the project.

C. STORAGE.

The General Contractor shall receive and store the finish hardware in a secure and dry area.

1.06 - WARRANTIES.

A. FURNISH THE FOLLOWING.

Warranties shall cover defects in material and workmanship for a period not less than listed below.

Closers:	10 years
Exit Devices:	3 years
All other hardware	1 year

1.07 - MAINTENANCE.

A. MAINTENANCE SERVICE.

Supply three (3) copies on any maintenance contracts for each hardware item supplied on the project.

B. EXTRA MATERIALS.

1.) **Additional Hardware**
Provide the owner with additional hardware as listed in section 3.06 of the hardware schedule that follows. All extra hardware is to be furnished with all installation instructions, installation tools, and fasteners normally supplied with item (s) specified.

2.) Extra Screws / Installation Tools.
Furnish five (5) additional installation tools normally furnished with each item of hardware requiring a special installation tool supplied by its manufacturer. All extra screws, fasteners, and installation tools are to be turned over to the owner at the completion of the job.

PART 2 PRODUCTS

2.01 - MANUFACTURERS.

A. APPROVED MANUFACTURERS.

The following manufacturer's products were used to establish these specifications.

Hager Companies	Hinges / Flat Goods / Stops / Mutes
Yale Security	Locksets / Cylinders / Door Closers
National Guard Products	Thresholds and weather seals
Rixson	O.H. Stops

2.02 - MATERIALS.

A. FASTENERS.

Furnish fasteners as required for the proper installation of the finish hardware. Install all finish hardware only with fasteners furnished by the manufacturers. Warranties and Labels will be void on material installed with unauthorized fasteners.

B. HINGES.

Comply with ANSI A156.1 - 1997 Standards. UL listed for use on fire rated doors (steel hinges) Furnish templet produced steel, brass, or bronze hinges of the types listed.

Non-removable pins for all swing out exterior doors, swing out corridor doors, and non-rising pins at all other doors.

Furnish electric thru wire hinges where specified or when using electric locking device.

Furnish all hinges from the same manufacturer in the following sizes.

1-3/4" thick doors up to 36" in width: furnish 4.5" hinges.
1-3/4" thick doors 37" to 48" in width: furnish 5.0" hinges.
1-3/4" thick doors over 48" in width: furnish 6.0" hinges.

Furnish the following quantities.

Furnish three (3) hinges per leaf for doors up to 90" in height.
Furnish four (4) hinges per leaf for doors up to 120" in height.
Furnish one (1) additional hinge for each 30" of additional height over 120".

Subject to compliance with requirements, approved products and manufacturers are:

Hinge types and locations	Hager	Stanley	McKinney
Furnish at exterior out swing doors, interior public toilet room doors.	BB1199	FBB199	T4A3386
Finish for hinges 630.			
Furnish at exterior in swing doors, interior doors with closers.	BB1168	FBB168	T4A3786
Furnish at balance of interior doors	1279	F179	T2714
Finish for hinges 652.			
Furnish as designated in HDW sets.	780-112HD	SL11HD	MCK12HD
Finish for Cont. Hinges to be 628.			

C. FLUSH BOLTS

Comply with ANSI A156.16 - 1989 standard

UL Listed for fire doors.

As codes and conditions require, provide manual or automatic flush bolts as listed.

Furnish bolts for top and bottom of inactive door leaf, with all necessary strikes, shims, and guides to insure proper installation and operation.
Furnish extended flush bolts for all doors over 7' in height. (Lever height between 5'6" & 6'6")
Furnish dust proof strikes with all flush bolts.

Subject to compliance with requirements, approved products and manufacturers are:

Type	Hager	Ives	Trimco
Manual flush bolt for non-rated wood doors.	282D	458B	3915
Manual flush bolt for non rated metal doors.	282D	458B	3915
Automatic type for UL listed wood doors.	291D	556B	3815
Automatic type for UL listed metal doors.	292D	559	3810
Constant latching type for UL listed metal doors.	293D	357B	3820
Constant latching type for UL listed wood doors.	294D	257B	3825
Dust proof strike.	280X	487/489	3910

Finish for flush bolts 626.

D. MEDIUM DUTY CYLINDRICAL LOCKS.

Comply with ANSI A156.2 - 1996, Series 4000, Operational Grade 2 standards.
Comply with ANSI A117.1 accessibility code and ADA requirements.
UL listed for use on fire rated doors.
All functions will feature the Free - Wheeling lever mechanism. When the outside lever is locked, it will rotate freely up and down while remaining securely locked.
All lock sets to be thru - bolted thru the door.
All lock sets to be 2 3/4" backset.
All lock sets to have deadlocking latchbolt.
Furnish the appropriate lock strike per frame conditions.

Subject to compliance with requirements, approved products and manufacturers are:

Functions	Yale	Russwin	Sargent
Passage Latch Set (F75)	5301LN	CL3910	7U15
Privacy Latch Set (F76)	5302LN	CL3920	7U65
Office Function Lockset (F81 / 82)	5307LN	CL3951	7G05
Store Room Function Lockset(F86)	5305LN	CL3957	7G04
Class Room Function Lockset (F84)	5308LN	CL3955	7G37
Design	AU	NZD	KL

Finish for cylindrical locksets. 626

E. **EXIT DEVICES.**

Comply with ANSI A156.3 - 1994, Operational Grade 1 standards.
Comply with ANSI A117.1 accessibility code and ADA requirements.
UL listed as panic hardware.
UL listed fire rated devices for use on all fire rated doors.
UL listed fire rated mullions for use on all fire rated doors.
Escutcheon and pull type trim shall be constructed of brass or bronze and lever trim shall use cast or forged levers to match lock sets and be thru-bolted with concealed fasteners.
All exposed components shall be brass, bronze, or stainless steel and available in a choice of architectural finished, and all exposed metal parts shall be of the same finish.
Install with thru-bolts or sex-nuts and bolts at all fastening points.
All trim shall be thru-bolted with concealed fasteners.
Furnish all non rated exit devices with cylinder dogging.
Furnish removable core cylinders, type as required by function.
All mullions shall be removable by use of a keyed cylinder.
All exit devices to be satin stainless steel 630.

Subject to compliance with requirements, approved products and manufacturers are:

Exit device Type	Yale	Corbin / Russwin	Precision
Rim	7100	ED5200	1100
Mortise	7130	ED5600	1300
Vertical Rod	7110	ED5400	1200
Concealed Vertical Rod	7100	ED5800	2800
Rim alarm	7116	ED5200M61	1100x ALK
Trim	600 Series	900 Series	4900 Series

Finish for exit devices and trim. 630

F. CYLINDERS.

Comply with ANSI A156.5 standards.
Furnish standard rim or mortise cylinders as required.
Cylinders are to be standard six (6) pin type removable core.

Subject to compliance with requirements, approved products and manufacturers are:

Cylinder types	Yale	Russwin	Sargent
Standard Rim Type	1109 / 1193	3000 / 3080	34 / 34IC
Standard Mortise Type	2153 / 2196	1000 / 1080	42 / 42IC

Finish for cylinders. 630

G. DOOR CLOSERS.

Comply with ANSI A156.4 - 1992 Operational Grade 1 standards.
Comply with ANSI A117.1 accessibility codes and ADA requirements.
UL listed for use with fire rated doors.
Furnish full rack and pinion type, with full molded covers, non-handed, and have separate valves to adjust closing speed, latching speed, and back check cushioning and positioning.
All closers are to be mounted with sex-nuts and bolts to the doors and the frame by wood or machine screws as required by the frame conditions..
Furnish mounting brackets or plates as required by the opening conditions
Closers at swing out exterior doors shall have UNI type's arms with built in spring shock absorber to smoothly decelerate the door as it reaches the positive stop position
Closers at exterior doors, fire rated interior doors and high frequency interior doors shall be factory sized per opening conditions (multi-sized closers at these locations are not acceptable).
Closers at non rated interior doors shall have multi-size spring power adjustment to permit setting of power from size 2 thru 6, and on barrier free closers size 1 thru 4.
Multi-sized closers must be field sized by the installer per manufacturer's instructions

Subject to compliance with requirements, approved products and manufacturers are:

Closer Types	Yale	Russwin	LCN
Parallel arm x spring buffer stop	4020	DC6400-A2	4110CUSH
Furnish at exterior swing out doors.			
Parallel arm	PA400	DC6410	4110
Furnish at interior swing out fire rated doors.			
Regular arm	400	DC6400	4010
Furnish at interior swing in fire rated doors.			
Parallel arm	PA4400	DC6210	4040
Furnish at interior swing out nor rated doors.			
Regular arm	4400BF	DC6200	4041
Furnish at interior swing in non rated doors.			

Finish for doors closers689

H. **PUSH AND PULLS**

Comply with ANSI A156.6 - 1994 standards.
Comply with ANSI A117.1 accessibility codes and ADA requirements.
All Pulls shall be thru-bolted to door.
All Push and Pull Plates shall be the product of one manufacturer
Fasteners as required by door material..

Subject to compliance with requirements, approved products and manufacturers are:

Push Plate Type	Hager	Trimco	Rockwood
4 x 16 .050	30S	1001-3	70
Pull Plate Type			
4 x 16 .050	33E	1059-3	102 x 70B
Off Set Pull	12J	1191-3	TBF157
Push Pull Set	153D/V/B	1731	11147

Finish for push and pulls 630

I. PROTECTION PLATES.

Comply with ANSI A156.6 - 1994 standards.
Furnish protection plates on the push side of all doors with door closer.
Furnish protection plates at the in-active door of all pairs of doors with door closers.
Furnish Mop Plates only where called out in hardware sets.
All protection plates shall be .050" satin stainless steel 630.
Fasteners as required by door material.
Furnish Kick Plates: 2" less door with on push side Mop Plates : 1" less door with on pull side.
Note: adjust accordingly for astragals, door edging, etc.

Subject to compliance with requirements, approved products and manufacturers are:

Protection Plate Types	Hager	Ives	Rockwood
Kick Plate - 8" high bottom rail permitting	190S	8400	K1050
Armor Plate - 40" high	190S	8400	K1050

J. DOOR STOPS AND HOLDERS.

Comply with ANSI A156.8 - 1994 standards. (Overhead stops and holders).
Comply with ANSI A156.16 - 1989 standards. (Floor and wall stops).
Furnish wall or floor stops at all doors as required by opening conditions, or as listed.
Furnish fasteners as required by wall or floor conditions
Furnish overhead stops where floor or wall stops can not be used or where listed.
Furnish overhead stops and holders with brass or stainless steel tracks as listed.
Furnish surface applied overhead stops and holders with thru-bolts for doors and wood or machine screws for frames.
Furnish exterior heavy duty floor stops at all exterior doors unless O.H. Stops are listed.

Subject to compliance with requirements, approved products and manufacturers are:

Wall and Floor Stops	Hager	Glynn Johnson	Ives
Interior cast dome type floor stop - 1" high	241F	FB13	436B
Interior cast dome type floor stop - 1 1/4" high	243F	FB17	438B
Interior wall stop convex	230W	50C	401
Interior wall stop concave	234W	60C	401 ½
Exterior heavy duty floor stop	252F	FB19	444B

Finish for stops 626.

Overhead Stops and Holders	Rixson	Glynn Johnson	Sargent
Standard duty - surface mount	10-000	450	1540

Finish for O.H. Stops 689

K. WEATHER AND SMOKE PROTECTION.

Comply with ANSI A156.22 - 1996 standards. (Door seals)
UL listed for use on fire rated doors. (Door seals)
Comply with ANSI A156.21 - 1996 standards. (Thresholds)
Comply with ANSI A117.1 accessibility codes and ADA requirements. (Thresholds)
Furnish door bottoms at all in swinging exterior doors.
Furnish drip caps at all exterior doors.
Furnish astragals @ all exterior pairs of doors.
Furnish thresholds with 1/4-20 stainless steel machine screws and lead anchors.
Furnish all Thresholds and weather-stripping mill finish aluminum.

Subject to compliance with requirements, approved products and manufacturers are:

Protection Types	National Guard	Pemko	Reese
Perimeter weather seal @ wood frames	43SB	B70C	340
Perimeter weather seal @ HM frames	120N	315	DS70
Perimeter smoke seal / Gasketing	2525	S88	797
Automatic door bottom	220N	412	320N
Threshold - for auto door bottom and in swinging exterior doors	413	270	S404
Threshold - for swing out doors	896V	2005AV	S483V
Door Bottoms	319	216	DB595
Drip Cap	16	346C	R201
Astragals	114	375	93

L. SILENCERS.

Comply with ANSI A156.16 - 1989 standards.
Furnish rubber silences for all openings that do not have weather-strip or seals, two silencers on pairs and three on single frames.

Subject to compliance with requirements, approved products and manufacturers are:

Silencer Type	Hager	Glynn Johnson	Rockwood
For metal frames.	307D	GJ64	608

2.03 - FINISHES.

A. FINISHES AND BASE MATERIALS.
Comply with ANSI A156.18 - 1993 standards
Furnish the following finishes and base metals.

ANSI #	Finish Description	Base Material
630	Satin Stainless Steel	Stainless Steel
626	Satin Chrome	Brass or Bronze
652	Satin Chrome	Steel
689	Silver Paint	Any

2.04 - KEYING.

A. KEYING REQUIREMENTS:
All locks and cylinders to be keyed to a new master key system.
Supplier to furnish the owner with a key cabinet Telkey or equal. Key cabinet to have a two tag system with expansion of 100% of the original keys in project.
The finish hardware supplier shall meet with the Architect and/or Owner to establish the final keying requirements for this project.
All locks and cylinders shall be factory master keyed and construction master keyed.
Furnish the following keys:
4 ea. Construction master keys.
6 ea Grand and/or master keys.
2 ea. Change keys per lock and cylinder.
Furnish to the owner, at completion of project, a copy of the factory key bitting list.

2.05 - KEY CONTROl

A. SECURITY.
The construction keys only will be issued to the general contractor for use during construction.
The permanent keys and a copy of the final keying schedule shall be delivered to the owner by the hardware supplier.

A. KEY ACTIVATION.
The hardware supplier shall assist the owner in activating the permanent keys.

PART 3 - EXECUTION.

3.01 - EXAMINATION.

A. FIELD CONDITIONS.
The hardware installer and general contractor shall examine all doors, frames and related items for conditions that would prevent the proper installation of the finish hardware.
Do not proceed until all corrections are made.

3.02 - PREPARATION AND INSTALLATION

A. PREPARATION.
The hardware installer shall read all notes included in the finish hardware schedule and become familiar with the finish hardware schedule.
The hardware installer shall read and understand the installation instructions packed with each item of hardware.

B. INSTALLATION.
Installation shall be by skilled workmen, who work with proper tools and shall be in accordance with manufacturer's instructions.
Hardware shall be installed accurately, applied securely, and adjusted properly.

The hardware installer shall install the hardware only with fasteners furnished by the manufacturer, hardware installed with unapproved fasteners will be rejected, fire labels and warranties will be void.

3.03 - FIELD QUALITY CONTROL.

A. HARDWARE SUPPLIER RESPONSIBILITY.
The hardware supplier shall provide the field quality control services listed below.
This service is expected by the Architect, and a complete report shall be submitted to the Architect and General Contractor after each field visit.
The hardware supplier is required to visit the job site at the deliver of the hardware and at the completion of hardware installation. After each visit the hardware supplier will send to the architect a report of his or her visit.

A.) On delivery the hardware supplier will inspect how the hardware is stored, this should be a dry space that can be secured. In addition the hardware supplier will go over the installation instructions with the installers and answer any question they may have to insure proper installation.

B.) After the hardware has been installed, the hardware supplier shall check the project to determine the proper application of the hardware according to the approved hardware schedule. Check that all hardware items including door control devices are properly adjusted.

The hardware supplier shall notify the Architect of any hardware not in accordance with the hardware schedule.

Where hardware is found to be installed incorrectly, the contractor shall repair, or replace as directed by the Architect.

3.04 - ADJUSTING AND CLEANING.

A. ADJUSTING.

The installer shall check and make final adjustments to each operation item of hardware on each door to ensure proper operation and function.
The installer shall adjust door control devices to compensate for final operation of air handling equipment.

B. CLEANING.

Clean all hardware using products recommenced by the manufacturer.
Clean all hardware with non-abrasive cleaners.
All hardware shall be left clean and free of disfigurements.

3.05 - PROTECTION.

A. The Contractor shall protect all items of hardware from damage until the owner accepts the project as complete.

3.06 - HARDWARE SETS.

HARDWARE SET 1

Doors: 101

Continuous Hinges
Exit Device Concealed V. R. (03)
Exit Device Concealed V. R.
Push / Pull Sets
Cylinders as Required
Closer / Stop x Bracket as Required
Threshold and weather-stripping by door supplier.

HARDWARE SET 2

Doors: 117

Butts
Lockset (F84)
Closer
Kickplate
W/S
Door Bottom
Threshold
Drip Cap

HARDWARE SET 3

Doors: 133

Butts
Rim Exit Device (08)
Closer / Stop
Kickplate
W/S
Door Bottom
Threshold
Drip Cap

HARDWARE SET 4

Doors: 114, 115

Continuous Hinges
Flush Bolts
Deadlock (Adams Rite MS1850 or Equal)
Push / Pull Sets
Cylinder x Cylinder
Closer / Stop x Bracket as Required
Threshold and weather-stripping by door supplier.

HARDWARE SET 5

Doors: 116

Butts
Rim Exit Device (08)
Closer
Kick Plate
Stop
Gasketing
Threshold

HARDWARE SET 6

Doors: 102, 103, 124, 129

Butts
Lockset (F86)
Closer
Kickplate
Stop
Kick Down Door Holder @ Door 129(Hager 270D or Equal)

HARDWARE SET 7

Doors: 104, 105, 106, 125, 126, 130, 131, 132

Butts
Lockset (F81/82)
Coat Hook (Hager 946P or Equal)
Stop

HARDWARE SET 8

Doors: 107, 111, 118, 119, 120

Butts
Lockset (F84)
Closer
Kickplate
Stop
Kick Down Door Holder (Hager 270D or Equal)

HARDWARE SET 9

Doors: 108, 109, 110, 121, 122, 123

Butts
Flush Bolts
Lockset (F86)
Sgl. Dummy Lever @ Inactive door
O.H. Stops (Both Doors)

HARDWARE SET 10

Doors: 112, 113, 127, 128

Butts
Latchset (F75)
Closer
Kickplate
Stop

End of Section 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Storefront framing.
4. Glazed entrances.
5. Interior borrowed lites.

B. Related Sections:
1. Division 08 Section "All-Glass Entrances and Storefronts."
2. Division 08 Section "Mirrors."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036 or nominal equivalent in inches.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. VOC Submittals:

1. Product Data for VOC: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.

C. Glass Samples: For each type of glass product other than clear monolithic vision glass, 12 inches (300 mm) square.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Qualification Data: For **installers**, **manufacturers of insulating-glass units with sputter-coated, low-e coatings**, **glass testing agency, and sealant testing agency**.

F. Product Certificates: For glass and glazing products, from manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass, glazing sealants, and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

H. Preconstruction adhesion and compatibility test report.

I. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: [**Five**] [**10**] <**Insert number**> years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written

instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

A. Windborne-Debris-Impact-Resistance Performance: Provide glazing systems on exterior applications that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. DuPont. (Buticite)
2. Solutia, Inc. (Safllex)

B. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with **one of** the following to comply with interlayer manufacturer's written recommendations:

a. Polyvinyl butyral interlayer.
b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

3. Interlayer Color: Clear unless otherwise indicated.

D. Laminated glass, in insulating or single glazed units, must conform to the requirements of the window unit manufacturer's specifications to provide Windborne-debris-impact-resistance per IBC requirements.

1. Provide glass product per laboratory test reports as provided by window manufacturer.

E. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with **manufacturer's standard** primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Laminated-Glass Types" Article.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from **one of** the following:
1. EPDM complying with ASTM C 864.
2. Silicone complying with ASTM C 1115.
3. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned **EPDM, silicone or thermoplastic polyolefin rubber** gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant for missile resistant glazing installations: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, provide and install sealant recommended and tested by the window manufacturer for the missile resistant system:

a. Provide ASTM C-920 Movement Class sealant recommended by manufacturer.
b. Confirm sealant type and manufacturer with window/storefront manufacturer.

2. Applications: Window systems tested to meet Windborne-Debris-Impact-Resistance Performance.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Dow Corning Corporation; 799.
b. GE Advanced Materials - Silicones; **UltraGlaze SSG4000** or **UltraGlaze SSG4000AC**.
c. May National Associates, Inc.; **Bondaflex Sil 200 GPN**.
d. Polymeric Systems, Inc.; PSI-631.
e. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
f. Tremco Incorporated; **Proglaze SSG** or **Tremsil 600**.
g. <**Insert manufacturer's name; product name or designation**>.

2. Applications: Window glazing applications which do not need to meet Windborne-Debris-Impact-Resistance Performance..

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.10 MONOLITHIC-GLASS TYPES

A. Glass Type **GL-**1: Clear heat-strengthened float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

B. Glass Type GL-2: Clear fully tempered float glass.

1. Thickness: **6.0 mm**.
2. Provide safety glazing labeling.

2.11 LAMINATED-GLASS TYPES (where not in insulated unit).

A. Glass Type GL-3a: Clear laminated glass with two plies of heat-strengthened float glass.

1. Thickness of Each Glass Ply: **5.0 mm**.
2. Interlayer Thickness: **0.060 inch (0.76 mm)**.
3. Provide safety glazing labeling.

2.12 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type GL-3: Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Outdoor Lite: 5.0 mm.
3. Outdoor Lite: Fully tempered float glass.
4. Interspace Content: Argon (90% min.).
5. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.

    a. Thickness of Each Glass Ply: 5.0 mm.
    b. Interlayer Thickness: 0.030 inch (0.76 mm).

6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
7. Visible Light Transmittance: 70 percent minimum.

8. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Related Sections:

1. Division 10 Section "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples: For each type of the following products:

1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.

D. Maintenance Data: For mirrors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Glazing Publications: Comply with the following published recommendations:

1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Arch Aluminum & Glass Co., Inc.
b. Avalon Glass and Mirror Company.
c. Binswanger Mirror; a division of Vitro America, Inc.
d. D & W Incorporated

e. Donisi Mirror Company.
f. Gardner Glass, Inc.
g. Gilded Mirrors, Inc.
h. Guardian Industries.
i. Head West.
j. Independent Mirror Industries, Inc.
k. Lenoir Mirror Company.
l. Maran-Wurzell Glass & Mirror.
m. National Glass Industries.
n. Stroupe Mirror Co., Inc.
o. Sunshine Mirror; Westshore Glass Corp.
p. Virginia Mirror Company, Inc.
q. Walker Glass Co., Ltd.

B. Clear Glass: Mirror Glazing Quality.

Nominal Thickness: 6.0 mm or As indicated.

C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.

Nominal Thickness: 6.0 mm or As indicated.

2.2 MISCELLANEOUS MATERIALS

A. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Franklin International; Titebond Division.
b. Laurence, C. R. Co., Inc.
c. Macco Adhesives; Liquid Nails Division.
d. OSI Sealants, Inc.
e. Palmer Products Corporation.
f. Pecora Corporation.
g. Royal Adhesives & Sealants; Gunther Mirror Mastics Division.
h. Sommer & Maca Industries, Inc.

2.3 MIRROR HARDWARE

A. Plated Steel Hardware: Formed-steel shapes with plated finish indicated.

2.4 FABRICATION

A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.

B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Install mastic as follows:

a. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

DIVISION 09 – FINISHES

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections include the following:

1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.
2. Division 07 Section "Thermal Insulation" for insulation installed with Z-shaped furring members.
3. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.
4. Division 09 Section "Gypsum Plastering" for metal lath supported by non-load-bearing steel framing.
5. Division 09 Section "Portland Cement Plastering" for metal lath supported by non-load-bearing steel framing.
6. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for non-load-bearing metal shaft-wall framing, gypsum panels, and other components of shaft-wall assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 20 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: **2-1/2 inches (64 mm)**.

D. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.

a. Minimum Base Metal Thickness: **0.0179 inch (0.45 mm)**.

2. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical or hat shaped.

E. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Armstrong World Industries, Inc.; Drywall Grid Systems.
   b. Chicago Metallic Corporation; [**640-C**] [**Fire Front 650-C**] [**660-C**] [**Fire Front 670-C**] Drywall Furring System.
   c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: As indicated on Drawings with minimum of **0.0312 inch (0.79 mm)** .
2. Depth: As indicated on Drawings (Minimum of 3 5/8").

B. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: As indicated on Drawings.

D. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch-(1.73-mm-) thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
2. Depth: 7/8 inch (22.2 mm) or as indicated in drawings.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
1. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
2. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within **1/8 inch in 12 feet (3 mm in 3.6 m0** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs as follows:

   a. Single-Layer Application: **16 inches (406 mm)** o.c., unless otherwise indicated.
   b. Multilayer Application: **16 inches (406 mm)** o.c., unless otherwise indicated.
   c. Tile backing panels: **16 inches (406 mm)** o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb, unless otherwise indicated.
   b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Exterior portland cement plasterwork (stucco) on metal lath.

B. Related Sections:

   1. Division 05 Section "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
   2. Division 06 Section "Rough Carpentry" for wood framing and furring included in portland cement plaster assemblies.
   3. Division 06 Section "Sheathing" for sheathing and water-resistant barriers included in portland cement plaster assemblies.
   4. Division 07 Section "Thermal Insulation" for thermal insulations and vapor retarders included in portland cement plaster assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

C. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
b. CEMCO.
c. Clark Western Building Systems.
d. Dietrich Metal Framing; a Worthington Industries company.
e. MarinoWARE.
f. Phillips Manufacturing Co.

2. Diamond-Mesh Lath for Walls: Self-furring, 2.5 lb/sq. yd. (1.4 kg/sq. m).
3. Diamond-Mesh Lath for Soffits: Self-furring, 3.4 lb/sq. yd. (1.8 kg/sq. m).

B. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper.

1. Provide paper-backed lath at exterior locations.

2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
    b. CEMCO.
    c. Clark Western Building Systems.
    d. Dietrich Metal Framing; a Worthington Industries company.
    e. MarinoWARE.
    f. Phillips Manufacturing Co.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.

5. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6.34 to 16 mm) wide; with perforated flanges.

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.

C. Bonding Compound: ASTM C 932.

D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for

application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Color for Finish Coats: White.

B. Masonry Cement: ASTM C 91, Type N.

1. Color for Finish Coats: White.

C. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match Architect's sample.

D. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

E. Sand Aggregate: ASTM C 897.

1. Color for Job-Mixed Finish Coats: In color matching Architect's sample.

F. Perlite Aggregate: ASTM C 35.

G. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American, an Oldcastle Company; Marblesil Stucco Mix.
b. California Stucco Products Corp.; Conventional Portland Cement Stucco.
c. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Premium Stucco Finish.
d. Florida Stucco; Florida Stucco.
e. LaHabra, a brand of ParexLaHabra, Inc.; Exterior Stucco Color Coat.
f. Omega Products International, Inc.; ColorTek Exterior Stucco.

g. QUIKCRETE; QUIKCRETE Finish Coat Stucco, No. 1201.
h. Shamrock Stucco LLC; Exterior Stucco.
i. SonoWall, BASF Wall Systems, Inc.; Thoro Stucco.
j. USG Corporation; Oriental Exterior Finish Stucco.

2. Color: As selected by Architect from manufacturer's full range.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and **3**/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

2. Masonry Cement Mixes:

a. Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
b. Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

C. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and **1-1/2 to 2** parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

D. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

3.4 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.
   1. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath unless the ceiling has a structural flat surface sheathing soffit above stuccoe.
   2. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

B. Install metal lath so that the finished stucco and lath has two layers of Style 2 vapor-permeable moisture barrier behind lath, the outer layer being the paper backing attached to the lath by the manufacturer.

3.5 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

   1. Install lath-type, external-corner reinforcement at exterior locations.
   2. Install cornerbead at interior and exterior locations.

C. Control Joints: Install control joints at locations indicated on Drawings to comply with following:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

   a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
   b. Horizontal and other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).

2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.
6. Where Drawings do not show control joints in compliance with the requirements above, confirm altered locations to be in specific locations approved by Architect for visual effect.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork**;** 3/4-inch (19-mm) thickness.

1. Portland cement mixes.

C. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; **1/2 inch (13 mm) thick**.

1. Portland cement mixes.

D. Plaster Finish Coats: Apply to provide float finish to match Architect's sample.

E. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.

3.7 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

B. Related Sections include the following:

1. Division 05 Section "Cold-Formed Metal Framing" for load-bearing steel framing that supports gypsum board.
2. Division 06 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.
3. Division 07 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
4. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.
5. Division 09 painting Sections for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.

d. National Gypsum Company.
e. PABCO Gypsum.
f. USG Corporation.

B. Type X:

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered.

C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.

2.3 TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.
d. National Gypsum Company.
e. USG Corporation.

2. Core: **5/8 inch (15.9 mm), Type X**.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
3. Fill Coat: For second coat, drying-type, all-purpose compound.
4. Finish Coat: For third coat, drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: **Vertical surfaces, unless otherwise indicated**.
2. Ceiling Type: **Ceiling surfaces**.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing**)**, unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners**, unless otherwise indicated**.
2. LC-Bead: Use **at exposed panel edges**.
3. L-Bead: Use **where indicated**.
4. U-Bead: Use **where indicated**.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, **rounded or beveled edges,** and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.8 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Stone thresholds.
3. Metal edge strips.

B. Related Sections:
1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 09 Section "Gypsum Board" for tile backers.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.60.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Included printouts of tile installation methods of tiles as recommended by manufacturer's and coordinated with TCA methods.

B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

C. Samples for Verification:
1. Metal edge strips in 6-inch (150-mm) lengths.

A. Tile/Grout Schedule: Schedule to be submitted referencing tile and coordinated grout for each location. Use tile reference system as indicated in the drawings.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For each type of product, signed by product manufacturer.

D. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain **tile of each type** from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Joint sealants.
2. Metal edge strips.

D. Mockups: Build mockups to verify visual compatibility of glass tile and specified grout.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2. Confirm size of mockups with Architect before construction.

a. Minimum size to be one foot high by full column width.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

A. Tile Types B-3, W-6 and W-7: Factory-mounted glazed ceramic mosaic tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile, Semigloss Group I or comparable product by one of the following:

   a. American Olean; Division of Dal-Tile International Inc.
   b. Daltile; Division of Dal-Tile International Inc.
   c. Interceramic.
   d. Lone Star Ceramics Company.
   e. Grupo Porcelanite.

2. Composition: **Vitreous or impervious natural clay or porcelain**.
3. Module Size: As indicated in the drawings.
4. Thickness: 1/4 inch (6.35 mm).
5. Face: **Plain** with cushion edges.
6. Surface: **Smooth, without** abrasive admixture.
7. Finish: **Semi-matt, clear** glaze.
8. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
9. Grout Color: As selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable **and matching characteristics of adjoining flat tile**. Provide shapes as indicated in Drawings.

B. Tile Types B-4 and W-8: Factory-mounted glazed ceramic mosaic tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile, Matte Group I or comparable product by one of the following:

   a. American Olean; Division of Dal-Tile International Inc.
   b. Daltile; Division of Dal-Tile International Inc.
   c. Interceramic.
   d. Lone Star Ceramics Company.
   e. Grupo Porcelanite.

2. Composition: Vitreous or impervious natural clay or porcelain.
3. Module Size: As indicated in the drawings.
4. Thickness: 1/4 inch (6.35 mm).
5. Face: Plain with cushion edges.
6. Surface: Smooth, without abrasive admixture.
7. Finish: Vellum, clear glaze.
8. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
9. Grout Color: As selected by Architect from manufacturer's full range.

10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as indicated in Drawings.

C. Tile Type F-4 and F-5: **Glazed** paver tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Colorbody Porcelain Cliff Pointe or comparable product by one of the following:

    a. American Marazzi Tile, Inc.
    b. American Olean; Division of Dal-Tile International Inc.
    c. Daltile; Division of Dal-Tile International Inc.
    d. Deutsche Steinzeug America, Inc.
    e. Interceramic.
    f. Laufen.
    g. Lone Star Ceramics Company.
    h. Grupo Porcelanite.
    i. Portobello America, Inc.
    j. Seneca Tiles, Inc.
    k. United States Ceramic Tile Company.

2. Composition: Through Color Porcelain.
3. Face Size: **18 by 18 inches Nominal**.
4. Thickness: **5/16 inch (7.9 mm)**.
5. Face: **Pattern of design indicated, with manufacturer's standard edges**.
6. Finish: **Vellum, opaque** glaze.
7. Tile Color and Pattern: **As selected by Architect from manufacturer's full range** and indicated in Finish Legend.
8. Grout Color: **As selected by Architect from manufacturer's full range**.
9. Coefficient of friction: In writing, confirm from manufacturer that coefficient of friction is acceptable per code and local authorities before installation.

D. Tile Type W-10: glass mosaic wall tile.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Glass Reflections or comparable product by one of the following:

    a. American Marazzi Tile, Inc.
    b. American Olean; Division of Dal-Tile International Inc.
    c. Daltile; Division of Dal-Tile International Inc.
    d. Deutsche Steinzeug America, Inc.
    e. Florida Tile Industries, Inc.
    f. Florim USA.
    g. Laufen.
    h. Grupo Porcelanite.
    i. Portobello America, Inc.
    j. Sicis.
    k. Seneca Tiles, Inc.
    l. United States Ceramic Tile Company.
    m. Walter-Zanger.

2. Module Size: 1 by 1 inch nominal.
3. Thickness: 1/16 inch.
4. Face: Pattern of design indicated, with manufacturer's standard edges.
5. Finish: Bright, smooth.
6. Tile Color and Pattern: As selected by Architect from manufacturer's full range per Finish Legend.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Mounting: Factory, back mounted.
9. Mounting: Pregrouted sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Provide metal strip edges as indicated in Drawings.

2.4 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following;

a. Bonsal American; an Oldcastle company.
b. C-Cure.
c. Custom Building Products.
d. Laticrete International, Inc.
e. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Bonsal American; an Oldcastle company.
b. C-Cure.
c. Custom Building Products.

d. Laticrete International, Inc.
e. MAPEI Corporation.
f. Comparable manufacturer as specifically recommended by tile manufacturer.

2. Polymer Type: As recommended by tile manufacturer.

C. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

1. Use sealants that have a VOC content of **250** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, **provide one of the following**;

a. DAP Inc.; **Titanium Enriched Kitchen and Bath Sealant** or **100 percent Silicone Kitchen and Bath Sealant**.
b. Dow Corning Corporation; Dow Corning 786.
c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
f. Tremco Incorporated; Tremsil 600 White.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for

flooring applications; **stainless-steel, ASTM A 666, 300 Series** exposed-edge material.

C. Temporary Protective Coating: **Either product** indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Grout Sealer: Manufacturer's standard **silicone** product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, **provide the following** product recommended by grout manufacturer.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with **thin-set mortar** comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with **thin-set mortar** with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work

neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Install glass wall tile so that pattern of mortar and or grout does not show through translucent backing film.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
2. Paver Tile: **3/16 inch (4.8 mm)**].
3. Glazed Wall Tile: 1/16 inch (1.6 mm)
4. Glass Wall Tile: 1/16 inch (1.6 mm).

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

I. Metal Edge Strips: Install at threshold joints in flooring and at locations indicated.

J. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.5 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCA F113.

    a. Tile Type: Floor installations.
    b. Thin-Set Mortar: **Latex-**portland cement mortar.
    c. Grout: **Polymer-modified sanded** grout.

B. Interior Wall Installations, Metal Studs or Furring:

1. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.

    a. Tile Type: Wall mounted tile.
    b. Thin-Set Mortar: **Latex-**portland cement mortar.
    c. Grout: **Polymer-modified sanded** grout.
2. Confirm additional application requirements for glass tiles manufacturer to ensure proper adhesion as well as to prevent tile adhesion grout from showing through to the surface as a pattern.

END OF SECTION 093000

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical tiles for ceilings and the following:

1. Custom perimeter trim system for ceiling “clouds.”
2. Exposed suspension systems.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light-Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For components with factory-applied color finishes.

1. Acoustical Tile: Set of 4 by 4 inch Samples of each type, color, pattern, and texture.
2. Concealed Suspension System Members: 12-inch- (300-mm-) long Sample of each type.
3. Exposed Moldings and Trim: Set of 12-inch- (300-mm-) long Samples of each type and color.

C. Qualification Data: For testing agency.

D. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.

D. Mockups: Build mockups of one rectilinear and one curved “cloud” in Ceiling system ACT-1 with custom trim to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2. Architect to select location of each mock-up cloud.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above

ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES, GENERAL

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL TILES (ACT-1)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc. Sticks Square Tegular w/No. 655 edge profile or a comparable product by one of the following:

1. BPB USA.
2. USG Interiors, Inc.
3. Chicago Metallic Corporation.
4. Ecophon CertainTeed, Inc.

B. Color: White.

C. LR: Not less than 0.88.

D. NRC: Not less than 0.60.

E. CAC: Not less than 30.

F. Edge/Joint Detail: Square Tegular.

G. Thickness: 3/4 inch.

H. Modular Size: 24 by 24 inches (610 by 610 mm).

I. Provide panels with HumiGard 30-year no-sag warranty or equal.

J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.3 ACOUSTICAL TILES (ACT-2)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Ultima Open Plan or a comparable product by one of the following:

1. BPB USA.
2. USG Interiors, Inc.
3. Chicago Metallic Corporation.
4. Ecophon CertainTeed, Inc.

B. Color: White.

C. Tile texture: Fine.

D. LR: Not less than 0.88.

E. NRC: Not less than 0.70.

F. CAC: Not less than 35.

G. Edge/Joint Detail: Beveled Tegular sized to fit flange of exposed suspension system members.

H. Thickness: 3/4 inch.

I. Modular Size: 24 by 24 inches (610 by 610 mm).

J. Provide panels with HumiGard 30-year no-sag warranty or equal.

K. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.4 ACOUSTICAL TILES (ACT-3)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; CeramaGuard w/Narrow edge profile or a comparable product by one of the following:

1. BPB USA.
2. USG Interiors, Inc.
3. Armstrong World Industries, Inc.
4. Chicago Metallic Corporation.
5. Ecophon CertainTeed, Inc.

B. Color: White.

C. LR: Not less than 0.80.

D. NRC: Not less than 0.60.

E. CAC: Not less than 30.

F. Edge/Joint Detail: Narrow reveal edge sized to fit flange of exposed suspension system members.

G. Thickness: 3/4 inch.

H. Modular Size: 24 by 24 inches (610 by 610 mm).

I. Provide panels with HumiGard 30-year no-sag warranty or equal.

J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Cap Material: Steel cold-rolled sheet.
4. Cap Finish: Factory Painted in color as selected from manufacturer's full range.

B. Provide metal suspension system recommended by lay-in ceiling tile manufacturer for installation conditions.

C. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

D. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

F. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

G. Hanger rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

H. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.6 METAL SUSPENSION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Suprafine XL or a comparable product by one of the following:

1. BPB USA.
2. USG Interiors, Inc.
3. Armstrong World Industries, Inc.
4. Chicago Metallic Corporation.
5. Ecophon CertainTeed, Inc.

B. Direct-Hung, Double-WebSuspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.

1. Structural Classification: Intermediate-duty system.
2. Exposed Steel Grid Width: 9/16”.
3. Color: Mirror finish or white as indicated per ceiling system designation in reflected drawings.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Available Products: Subject to compliance with requirements, products by suspension grid system manufacturer.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.8 CUSTOM PERIMETER TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Axiom-Classic Custom Permeter Trim or a comparable product by one of the following:

1. BPB USA.
2. USG Interiors, Inc.
3. Armstrong World Industries, Inc.
4. Chicago Metallic Corporation.
5. Ecophon CertainTeed, Inc.

B. Custom Perimeter Trim Color: Manufacturer’s standard color as indicated in drawings.

C. Components: Provide trim pieces as necessary to complete “cloud” configurations indicated in reflected ceiling plans.

1. All components and trim detail pieces to be by same manufacturer.
2. Edge trim system for suspended ceiling system, extruded aluminum alloy 6063 trim channel, 10 foot straight or curved profiles to minimum 24 inches for 2 through 8 inch hig inside and outside radii for acoustical and for drywall applications.
3. Trim Channel: 2" wide face with 3/4 inch horizontal legs, straight or curved sections with special bosses formed for attachment to the Axiom tee-bar connection clip or hanging clip; commercial quality, extruded aluminum, factory-finished in color specified in Plans; (custom paint finish color-matched to approved sample).
4. Outside Corner Posts (Straight Only): Commercial quality extruded aluminum sections formed to match the Axiom trim channel profile; pre-assembled with built-in splice plates that connect to straight sections; 7/8 inch x 7/8 inch x 2"; factory-finished in factory-applied baked polyester paint.
5. Inside Corners (Straight Only): Commercial quality extruded aluminum sections formed to match the Custom trim channel profile that connect to straight sections, 12 inch x 3/4 inch x 2” factory-finished in factory-applied baked polyester paint.

D. Accessories:
1. Provide manufacturer’s recommended accessories per manufacturer’s shop drawing design.
    a. Hanging clips, commercial quality aluminum, unfinished.
    b. Splice with set screws, galvanized steel, unfinished, used to attached factory-mitered inside corners
    c. Splice with set screws, galvanized steel, unfinished, used to attach joints between sections of trim.

d. T-bar Connector Clip, galvanized steel, unfinished, used to attach channel trim to supporting suspension members.
e. Perimeter Trim Hold Down Clip used to secure cut edges of metal panels at the Custom trim.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical tile ceilings to comply with ASTM C 636, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.

3.4 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient stair accessories.
3. Resilient molding accessories.

B. Related Sections:
1. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.

C. Samples for Initial Selection: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 STANDARD RESILIENT BASE

A. Resilient Base:
1. Products: Basis of Design: Subject to compliance with requirements provide Johnsonite; Rubber Base or comparable product by one of the following:
   a. Armstrong World Industries, Inc.
   b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   c. Endura Rubber Flooring; Division of Burke Industries, Inc.
   d. Flexco, Inc.
   e. Johnsonite.
   f. Mondo Rubber International, Inc.
   g. Musson, R. C. Rubber Co.
   h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
   i. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TP (rubber, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe) Straight (flat or toeless) with angled top and surface reveal.

C. Minimum Thickness: **0.125 inch (3.2 mm)**.

D. Height: **4 1/4 inches**.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: See finish schedule in Drawings.

2.2 ARCHITECTURAL RESILIENT BASE

A. Resilient Base:
1. Products: Basis of Design: Subject to compliance with requirements provide Johnsonite; Reveal Millwork Rubber Base or comparable product by one of the following:

   a. Allstate Rubber Corp.; Stoler Industries.
   b. Armstrong World Industries, Inc.
   c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   d. Endura Rubber Flooring; Division of Burke Industries, Inc.
   e. Flexco, Inc.
   f. Johnsonite.
   g. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
   h. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TP (rubber, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Straight (flat or toeless) with angled top and surface reveal.

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: 4 ¼ inches (102 mm).

E. Lengths: Cut lengths 96 inches (2438 mm) long.

F. Outside Corners and Inside Corners: Job formed per manufacturer’s recommendations.

G. Finish: Manufacturers Standard As selected by Architect from manufacturer's full range.

H. Colors and Patterns: See Finish Schedule in drawings.

2.3 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

    a. Cove Base Adhesives: Not more than 50 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid vinyl floor planks.
2. Linoleum floor tile.

B. Related Sections:

1. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor tile indicated.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1. Installer / Applicator: Perform installation with skilled, experienced and trained workmen supervised by trained personnel who shall have a minimum three (3) years successful experience in installations of similar size and scope.

B. Manufacturer Qualifications: A firm experienced a minimum five (5) years in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct testing, meeting requirements of ISO/IEC (International Organization for Standardization / International Electrotechnical Commission) Standard 17025 or ASTM E699 and ASTM E329.

D. Source Limitations: Obtain each tile type of primary flooring materials through one source from a single manufacturer.

1. For each resilient tile type provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials

E. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 WARRANTY

1. Manufacturer Warranty. Provide manufacturer's Ten (10) year limited warranty stating installed flooring tiles are guaranteed to be free from wear-through defect due to normal use in commercial applications.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.7 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 7**0 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 SOLID VINYL FLOOR TILE

A. Basis of Design Product: Subject to compliance with requirements provide Parterre Flooring Systems Vinyl “Wood Plank” tiles or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. Flexco.
3. Johnsonite.
4. Roppe Corporation, USA.
5. Tarkett, Inc.
6. TOLI International.

B. Tile Standard: ASTM F 1700.

1. Class: Class III, printed film vinyl tile.
2. Type: Type B, embossed surface.

C. Thickness: **0.120 inch (3.0 mm).**

D. Wearlayer Thickness: Minimum **0.020 inch (0.5 mm) to meet ASTM F 1700 specifications for Commercial Use.**

E. Size: As indicated in drawings.

F. Manufacturer’s Warrenty: 10 Year Limited Warranty.

G. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 LINOLEUM FLOOR TILE

A. Basis of Design Product: Subject to compliance with requirements provide Forbo Flooring, Inc; Marmoleum Composition Tile (MCT) or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. Johnsonite Inc. A Tarkett Company.

B. Tile Standard: ASTM F 2195; Standard Specifications for Linoleum Tile Flooring.

C. Thickness: **0.080 inch (2.0 mm).**

D. Surface: smooth.

E. Size: Manufacturer's standard nominal one foot by one foot size module (13" x 13" for MCT tiles).

F. Slip Resistance: 0.60 for flat surfaces in accordance with ASTM D 2047 and to meet ADAAG Guidelines.

G. Chemical Resistance: Tested in accordance with ASTM F 925, Standard Test Method for Resistance to Chemicals of Resilient Flooring.

H. Static Load Limit: 500 psi minimum.

I. Backing: Polyester.

J. Manufacturer's Warranty: 10 Year Limited Warranty.

K. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Use adhesives that comply with the limits of the authorities having jurisdiction for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

C. Joint Sealant for Linoleum Floor Tile: If recommended, silicone sealant of type and grade as recommended in writing by manufacturer to suit linoleum floor tile.

D. Floor Polish: Provide protective liquid floor polish products as and if recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply three coat(s).
2. Apply floor polishes only to tiles where manufacturer specifically recommends the use of polish.

E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl wall covering.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Full width by 36-inch- (914-mm-) long section of wall covering from same print run or dye lot to be used for the Work. Show complete pattern repeat**.** Mark top and face of fabric.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

D. Maintenance Data: For wall coverings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.

2. Fire-Growth Contribution: Textile wall coverings tested according to **NFPA 286** and complying with test protocol and criteria in the 2003 IBC.

PART 2 - PRODUCTS

2.1 WALL COVERINGS

A. General: Provide rolls of each type of wall covering from same print run or dye lot.

2.2 VINYL WALL COVERING

A. Vinyl Wall-Covering Standards: Provide **mildew-resistant** products complying with the following:

1. FS CCC-W-408D and CFFA-W-101-D for Type II, Medium-Duty products.

a. Basis of Design: Subject to compliance with requirements provide the following vinyl wall-covering or a product of listed manufacturer offering products of equivalent quality, design, and pattern:
b. Elykon Wallcovering; Sticks Wallcovering.

B. Available Listed Manufacturers: Subject to compliance with requirements, alternate manufacturers offering products that may be incorporated into the Work include, the following:

1. Eykon Wallcovering
2. Vertical Wall Solutions
3. MDC Wallcovering
4. Koroseal
5. Kenmark Incorporated
6. Len Tex
7. JM Lynne

8. If an alternate wall covering is provided, the product will be of equivalent quality, design, and pattern, as judged solely by the Architect.

C. Total Weight Excluding Coatings: 20 oz/ly (620 g/lmn).

D. Width: **54 inches (1372 mm)**.

E. Backing: Osnaburg fabric.

F. Pattern Match: Reverse Hang/Random match.

G. Colors, Textures, and Patterns: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining**,** strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Primer/Sealer: Mildew resistant, complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall-covering manufacturer for intended substrate.

C. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
   1. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   2. Painted Surfaces: Treat areas susceptible to pigment bleeding.

C. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

E. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

F. Install reversing every other strip.

G. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

H. Match pattern 72 inches (1830 mm) above the finish floor.

I. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and **6 inches (150 mm)** from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.

J. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

K. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

L. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

M. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete.
2. Steel.
3. Galvanized metal.
4. Aluminum (not anodized or otherwise coated).
5. Wood.
6. Plastic trim fabrications.
7. Exterior portland cement plaster (stucco).

B. Related Requirements:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 09 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. Cloverdale Paint.
4. Color Wheel Paints & Coatings.
5. ICI Paints.
6. PPG Architectural Finishes, Inc.
7. Sherwin-Williams Company (The).
8. Zinsser.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

1. **30** percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: **MPI #4.**

2.4 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based: **MPI #3.**

B. Primer, Bonding, Water Based: **MPI #17.**

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.5 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal: As recommended by top coat manufacturer's specifications.

B. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

C. Primer, Quick Dry, for Aluminum: **MPI #95.**

2.6 WOOD PRIMERS

A. Primer, Latex for Exterior Wood: **MPI #6.**

2.7 WATER-BASED PAINTS

A. Latex, Exterior Flat (Gloss Level 1): **MPI #10.**

B. Latex, Exterior Semi-Gloss (Gloss Level 5): **MPI #11.**

C. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): **MPI #163.**

2.8 SOLVENT-BASED PAINTS

A. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): **MPI #94.**

B. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): **MPI #81.**

2.9 FLOOR COATINGS (OTHER THAN EXTERIOR CONCRETE DECKS).

A. Sealer, Solvent Based, for Concrete Floors: **MPI #104.**

2.10 FLOOR COATINGS FOR EXTERIOR CONCRETE DECKS.

A. Sealer, Water Based, for Concrete Floors:

1. Specialty Chemicals Corp.; StoneLok “E3.”

2.11 TRAFFIC/PARKING LINE PAINTS ON ASPHALT OR CONCRETE

A. Traffic Marking Paint, Latex: MPI #97.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Portland Cement Plaster: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following**:**
1. SSPC-SP 3, "Power Tool Cleaning."

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:
   a. Prime Coat: Primer, alkali resistant, water based**, MPI #3**.
   b. Intermediate Coat: Latex, exterior, matching topcoat.
   c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)**, MPI #15**.

B. Exterior Decking Concrete Substrates, Traffic Surfaces:

1. Waterborne Epoxy System:

   a. Prime Coat: StoneLok “E3” Sealer, waterborne, for concrete floors; Install per manufacturer’s specifications and recommendations.
   b. First Intermediate Coat: StoneLok “E3” Sealer, waterborne, for concrete floors; Install per manufacturer’s specifications and recommendations.
   c. Second Intermediate Coat: StoneLok “MLT Plus” Penetrating Sealer, waterborne, for concrete floors; Install per manufacturer’s specifications and recommendations.
   d. Topcoat: StoneLok “MLT Plus” Penetrating Sealer, waterborne, for concrete floors; Install per manufacturer’s specifications and recommendations.
   e. Confirm Sealer coat order per Manufacturer’s express written directions.

C. Concrete Substrates (Other than exterior decks), Traffic Surfaces:

1. Water-Based Clear Sealer System:

   a. Prime Coat: Sealer, water based, for concrete floors**, MPI #99**.
   b. Intermediate Coat: Sealer, water based, for concrete floors**, MPI #99**.
   c. Topcoat: Sealer, water based, for concrete floors**, MPI #99**.

D. Steel Substrates:

1. Alkyd System:

   a. Prime Coat: Primer, alkyd, anticorrosive for metal**,** MPI #79 or Shop primer specified in Division 05 Section where substrate is specified.
   b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
   c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**,** MPI #94.

E. Galvanized-Metal Substrates:

1. Alkyd System:

a. Prime Coat: Primer, galvanized metal**,** as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
1) Shop primer specified in Division 05 Section where shop priming indicated. Confirm compatibility with intermediate and top-coat paint.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)**, MPI #94**.

F. Aluminum Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, quick dry, for aluminum**, MPI #95**.
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5)**, MPI #163**.

G. Wood Substrates: Including wood trim.

1. Latex System:
a. Prime Coat: Primer, latex for exterior wood, MPI #6.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

H. Plastic Trim Fabrication Substrates:

1. Latex System:
a. Prime Coat: Primer, bonding, water based, MPI #17.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.

I. Portland Cement Plaster Substrates:

1. Latex System:
a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1)**, MPI #10**.

J. Traffic Marking Paint on Pavement:

1. Minimum Two coats, spray applied per Manufacturer’s Specifications and Application system.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Steel.
3. Galvanized metal.
4. Aluminum (not anodized or otherwise coated).
5. Wood.
6. Gypsum board.
7. Cotton or canvas insulation covering.
8. ASJ insulation covering.

B. Related Requirements:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
3. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
4. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. Cloverdale Paint.
4. Color Wheel Paints & Coatings.
5. ICI Paints.
6. PPG Architectural Finishes, Inc.
7. Sherwin-Williams Company (The).
8. Zinsser.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.

3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Colors: As indicated in a color schedule.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: **MPI #4.**

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: **MPI #50.**

B. Primer, Alkali Resistant, Water Based: **MPI #3.**

C. Primer Sealer, Alkyd, Interior: **MPI #45.**

D. Primer, Bonding, Water Based: **MPI #17.**

E. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.5 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive, for Metal: **MPI #79.**

B. Primer, Alkyd, Quick Dry, for Metal: **MPI #76.**

2.6 WATER-BASED PAINTS

A. Latex, Interior, (Gloss Level 3): **MPI #52.**

B. Latex, Interior, (Gloss Level 4): **MPI #43.**

C. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5): **MPI #141.**

2.7 SOLVENT-BASED PAINTS

A. Alkyd, Interior, Semi-Gloss (Gloss Level 5): **MPI #47.**

2.8 FLOOR COATINGS

A. Sealer, Solvent Based, for Concrete Floors: **MPI #104.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent.
4. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat,

but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in occupied spaces other than equipment rooms including all surfaces above non-continuous “clouds” in main assembly space:

   a. Equipment, including panelboards.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Plastic conduit.
   g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   h. Other items as directed by Architect.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior**, MPI #50**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 3)**, MPI #52**.

B. Concrete Substrates, Traffic Surfaces:

1. Solvent-Based Clear Sealer System:

a. First Coat: Sealer, solvent based, for concrete floors**, MPI #104**.
b. Topcoat: Sealer, solvent based, for concrete floors**, MPI #104**.

C. Steel Substrates:

1. Alkyd System:
a. Prime Coat where not shop primed: Primer, alkyd, anti-corrosive, for metal**, MPI #79** or primer, alkyd, quick dry, for metal**, MPI #76**.
b. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**, MPI #47**.

D. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer, galvanized, water based**, MPI #134**.
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
1) Confirm shop applied finish specified in Section 05 “Metal Stairs” is compatible with intermediate and top-coat specified here-in.
c. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)**, MPI #141**.

E. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System:

a. Prime Coat: Primer, quick dry, for aluminum**, MPI #95**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**, MPI #54**.

F. Wood Substrates: Including architectural woodwork..

1. Latex System:

a. Prime Coat: Primer, latex, for interior wood**, MPI #39**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)**, MPI #54**.

2. Alkyd System for non-factory finished doors and cabinetry:

a. Prime Coat: Primer sealer, alkyd, interior**, MPI #45**.
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)**, MPI #47**.

G. Fiberglass and Plastic Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water based**, MPI #17**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 4)**, MPI #43**.

H. Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior**, MPI #50**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 3)**, MPI #52**.

I. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior**, MPI #50**.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 3)**, MPI #52**.

END OF SECTION 099123

DIVISION 10 – SPECIALTIES

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Dimensional characters..
2. Panel signs.

B. Related Sections include the following:

1. Division 01 Section "Project Sign" for temporary Project identification signs.
2. Division 23 Section "Mechanical Identification" for labels, tags, and nameplates for HVAC systems and equipment.
3. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements**,** including tactile characters and Braille, and layout for each sign.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:

1. Aluminum.

2. Acrylic sheet.
3. Die-cut vinyl characters and graphic symbols. **Include representative samples of available typestyles and graphic symbols.**

D. Sign Schedule: Use same designations indicated on Drawings.
1. Note: Signage schedule listing room names and/or designations and numbers will be provided by the Owner for reference in Contractors Sign Schedule.

E. Maintenance Data: For signs to include in maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

C. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: Class A as follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of **metal and polymer** finishes beyond normal weathering.
b. Deterioration of embedded graphic image **colors and sign lamination**.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

C. Steel:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial or forming steel.
2. Steel Sheet: **electrolytic zinc-coated, ASTM A 591/A 591M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed**.
3. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type **304**, stretcher-leveled standard of flatness.
4. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi (290-MPa) minimum yield strength.
5. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.

D. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

E. Cast resin material: Of thickness indicated in drawings, and to meet or exceed the mechanical and physical properties of “3form Varia Ecoresin.”

F. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on

G. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 DIMENSIONAL CHARACTERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. A. R. K. Ramos.
4. ASI-Modulex, Inc.
5. Bunting Graphics, Inc.
6. Charleston Industries, Inc.
7. Gemini Incorporated.
8. Grimco, Inc.
9. Innerface Sign Systems, Inc.
10. Metal Arts; Div. of L&H Mfg. Co.
11. Mills Manufacturing Company.
12. Mohawk Sign Systems.
13. Nelson-Harkins Industries.
14. Signature Signs, Incorporated.
15. Southwell Company (The).

B. Fabricated Channel Characters: Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories. Comply with the following requirements:
1. Aluminum Sheet: Not less than 0.090 inch (2.29 mm) thick.
    a. Finish: **Painted**.
    b. Color: **As selected by Architect from manufacturer's full range**.
2. Steel Sheet: Painted, not less than 0.050 inch (1.27 mm) thick for face and 0.031 inch (0.78 mm) thick for returns.
    a. Color: **As selected by Architect from manufacturer's full range**.
3. Provide manufacturer's hardware for projection mounting of channel characters at distance from wall surface **indicated in drawings**.

C. Cutout Characters: Provide characters with square-cut, smooth edges. Comply with the following requirements:

1. Aluminum Sheet: **0.25 inch (6.35 mm)** thick.
    a. Finish: **Painted**.
    b. Color: **As selected by Architect from manufacturer's full range**.
2. Mounting: **Projected with concealed noncorroding studs** for substrates encountered.

D. Dimensional Character Sign Schedule:

1. Schedule: Refer to signage List below and Drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

2. Sign on front of building:

   a. Sign & Character Size: As indicated in drawings.
   b. Text/Message: As indicated in drawings.
   c. Location: Front of Building As indicated.

3. Sign on free standing concrete pylon:

   a. Sign & Character Size: As indicated in drawings.
   b. Text/Message: As indicated in drawings.
   c. Location: Face of Concrete Monolith As indicated.

4. Sign on Curved Reception Wall:

   a. Sign & Character Size: As indicated in drawings.
   b. Text/Message: As indicated in drawings.
   c. Location: Curved wall behind reception area desk.

2.3 PANEL SIGNS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. Allen Industries Architectural Signage
4. Allenite Signs; Allen Marking Products, Inc.
5. APCO Graphics, Inc.
6. ASI-Modulex, Inc.
7. Best Sign Systems Inc.
8. Bunting Graphics, Inc.
9. Fossil Industries, Inc.
10. Gemini Incorporated.
11. Grimco, Inc.
12. Innerface Sign Systems, Inc.
13. InPro Corporation
14. Matthews International Corporation; Bronze Division.
15. Mills Manufacturing Company.
16. Mohawk Sign Systems.
17. Nelson-Harkins Industries.
18. Seton Identification Products.
19. Signature Signs, Incorporated.
20. Supersine Company (The)

B. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:

1. Co-polyester resin panels with decorative inner layers: Raised graphics **with Braille** 1/32 inch (0.8 mm) above surface with contrasting colors **as selected by Architect from manufacturer's full range** of anodized aluminum finishes and laminated to resin panel back.
   a. Resin Panel Product: 3-Form Varia Ecoresin.
   b. Design/Pattern: As indicated in the drawing finish schedule.
   c. Substitutions: Request for substitutions will be considered in accordance with provisions of Section 016000.
2. Edge Condition: **Square cut**.
3. Corner Condition: **Square**.
4. Mounting: **Unframed**.

   a. **Wall** mounted with Exposed cylindrical aluminum studs with ½" spacers from wall surface with internal screw attachment to construction below.
   b. Manufacturer's standard anchors for substrates encountered.
5. Color/Design/Pattern/Finish: Indicated in finish schedule as selected by Architect from manufacturer's full range.
6. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with applied anodized aluminum decal.

C. Attachment post: Fabricate stud post, ½" spacers and fittings for stud-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory finish in clear anodized finish.

D. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of **transparent covers with paper inserts printed by Owner**.

1. Furnish insert material and software for creating text and symbols for **PC-Windows** computers for Owner production of paper inserts.

E. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

F. Subsurface Copy: Apply minimum 4-mil- (0.10-mm-) thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.

G. Panel Sign Schedule:

1. Contractor to work with Architect to develop initial signage schedule for review.

2. Provide signs for all rooms with doors in addition to signage for restrooms and signs at each counter unless otherwise indicated in drawings

3. Sign Type:

    a. Sign Size: 6” by 8” or as indicated in drawings.
    b. Character Size: ¾” high or as indicated in drawings.
    c. Text/Message: As directed by the Owner’s schedule.
    d. Location: One sign by each door, roll-down coiling grills or service counters.
    e. General Form: See Sample shop drawing attached at end of this Section for general panel signage design.

2.4 REFLECTIVE ALUMINUM PARKING SIGNAGE

A. Provide signage as indicated in civil drawings.

B. Available Manufacturers include but are not limited to:

1. American Graphics Inc.
2. A.R.K. Ramos.
3. ASI Sign Systems, Inc.
4. Charleston Industries, Inc.
5. Gemini Incorporated.
6. Grimco, Inc.
7. Innerface Sign Systems, Inc.
8. Kaltech Industries Group, Inc.
9. Metal Arts; Div. of L&H Mfg.
10. Mills Manufacturing, Inc.
11. Mohawk Sign Systems.
12. Signature Sign Signs, Inc.
13. Southwell Co. (The).

C. Sheet aluminum parking signage reflective surface: Fabricate parking signs to required sizes and styles, using metals and thickness indicated. Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Comply with requirements indicated for finish, style, and size.

1. Aluminum Sheet: To meet ASTM B209 and be formed to resist warpage.
2. Finished surface: Reflective surface to meet current codes and specifications and to meet the requirements of ASTM D4956 Type I.
3. Signage Content: As indicated in Drawings.
4. For Exterior Signage, use Manufacturer’s recommended mechanical attachment method to meet the service requirements of the installation situation.
    a. Provide galvanized steel site post as required which will resist 130 m.p.h. winds.

2.5 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance.

Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.6 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.

B. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.

2.9 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for **five** years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items**, including anchor inserts,** are sized and located to accommodate signs.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.

B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
2. Confirm mounting heights with Architect in writing.

C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
1. Projected Mounting: Mount characters at projection distance from wall surface indicated.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Plastic-laminate-faced phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

B. Related Sections:
1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking.
2. Division 10 Section "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1. Include data confirming that panels meet current IBC and NFPA standards for Class A material.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted toilet accessories.
2. Show locations of reinforcements for compartment-mounted grab bars.
3. Show locations of centerlines of toilet fixtures.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for units, prepared on 6-inch-(152-mm-) square Samples of same thickness and material indicated for Work.

E. Product Certificates: For each type of toilet compartment, from manufacturer.

F. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" for toilet compartments designated as accessible.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

D. Stainless-Steel Castings: ASTM A 743/A 743M.

E. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.

2.2 PHENOLIC-CORE UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, PSISC; Columbia Partitions; 68000 Penolic Core Series with plastic laminate facing or comparable product by one of the following:

1. Accurate Partitions Corporation.
2. American Sanitary Partition Corporation.
3. Ampco, Inc.
4. Bobrick Washroom Equipment, Inc.
5. Bradley Corporation; Mills Partitions.
6. Flush Metal Partition Corp.
7. General Partitions Mfg. Corp.
8. Global Steel Products Corp.
9. Knickerbocker Partition Corporation.
10. Metpar Corp.
11. Partition Systems Incorporated of South Carolina.
12. Rockville Partitions Incorporated.

B. Toilet-Enclosure Style**:** Overhead braced.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, and Pilaster Construction: Solid phenolic-core panel material with Plastic-Laminate Finish facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 3/4-inch- (19-mm-) thick panels.

E. Pilaster Shoes: Fabricated from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, stainless steel.

G. Phenolic-Panel Finish:

1. Plastic-Laminate Finish: Two colors and patterns in each room.
2. Color and Pattern**:** As selected by Architect and indicated in Drawings.
3. Where plastic-laminate finishes are indicated, provide plastic-laminate specified in drawings or an approved substitution by one of the following manufacturer’s.
   a. Formica.
   b. Laminart.
   c. Wilsonart.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel.
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper.

Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

   a. Pilasters and Panels: 1/2 inch (13 mm).
   b. Panels and Walls: 1 inch (25 mm).

2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer **than two brackets attached near top and bottom of panel.**

a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.
1. Provide blocking in wall as required to structurally support screens.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wash room accessories.
2. Custodial accessories.

B. Related Sections include the following:

1. Division 9 Section "Ceramic Tile" for ceramic toilet and bath accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19 flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) minimum nominal thickness.

D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 WASHROOM ACCESSORIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. A & J Washroom Accessories, Inc.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. General Accessory Manufacturing Co. (GAMCO).

B. Basis-of-Design Product: The designs for accessories are based on products indicated. Catalogue number listed in the Schedule, which is in the drawings, refer to products manufactured by “Bobrick Washroom Equipment, Inc.” (except where otherwise noted) and serve as the standard of quality for this project.

1. Subject to compliance with requirements provide the scheduled accessory or a product of another manufacturer offering products of equivalent quality, design, and pattern, as judged solely by the Architect.

C. See Washroom accessories schedule for specific products and their designations.

2.3 CUSTODIAL ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. General Accessory Manufacturing Co. (GAMCO).

B. Mop and Broom Holder

1. Bobrick unit No. BOB223X24.
2. Description: Wall-mounted unit with mop/broom holder.
3. Bobrick Length: 24”.
4. Mop/Broom Holders: Three spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Mounting height: To be confirmed by Architect on site.

C. Stainless Steel Shelf

1. Bobrick unit No. BOB295X24.

2. Description: Wall-mounted unit with mop/broom holder.
3. Stainless Steel Guage: 18.
4. Bobrick Length: 24”.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Mounting location: Min. 8” above mop and broom holder per Architect’s direction on site.

2.4 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

B. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 6 keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 WASHROOM ACCESSORY SCHEDULE

A. For items not listed in this schedule, see Schedule in drawings.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Sections:

1. Division 09 painting Sections for field painting fire protection cabinets.
2. Division 10 Section "Signage" for directional signage to out-of-sight fire extinguishers and cabinets.
3. Division 10 Section "Fire Extinguishers."
4. Division 21 Section "Water-Based Fire-Suppression Systems" for hose systems, racks, and valves.
5. Division 26 Sections for low-voltage wiring for fire protection cabinet alarms.
6. Division 26 Section "Interior Lighting" for fire extinguisher location lights.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Size: 6 by 6 inches (150 by 150 mm) square.

C. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

D. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209 (ASTM B 209M).
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Larsen's Manufacturing Company; Model O-3216 or comparable product by one of the following:

a. Fire End & Croker Corporation.
b. J. L. Industries, Inc., a division of Activar Construction Products Group.
c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
d. Larsen's Manufacturing Company.
e. Modern Metal Products, Division of Technico Inc.

B. Cabinet Construction: Nonrated or 1-hour fire rated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Steel sheet.

1. Shelf: Same metal and finish as cabinet.

A. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
1. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.

B. Cabinet Trim Material: Same material and finish as door.

C. Door Material: Steel sheet.

D. Door Style: Flush opaque panel, frameless, with no exposed hinges.

E. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide concealed hinge permitting door to open 180 degrees.

F. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER”

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Black.
4) Orientation: Vertical.

G. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

a. Exterior of cabinet door, and trim except for those surfaces indicated to receive another finish.
b. Interior of cabinet.

2. Steel: Baked enamel or powder coat.

3. Manufacturer's standard stainless steel for the following:

    a. Exterior of cabinet door, and visible trim except for those surfaces indicated to receive another finish.
4. Stainless Steel: **No. 4**.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning"

B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicate or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fire Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet unless otherwise indicated.

a. Confirm heights with State Fire Marshal’s representative.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
2. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections:

1. Division 10 Section "Fire Extinguisher Cabinets."
2. Division 15 Section " Kitchen Hood System" for fire extinguishing systems provided as part of commercial kitchen exhaust hoods.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
h. Larsen's Manufacturing Company.
i. Moon-American.
j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
k. Potter Roemer LLC.
l. Pyro-Chem; Tyco Safety Products.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Wet-Chemical Type – FE-W: UL-rated 2-A:1-B:C:K, **1.6-gal.** **(6-L)** nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.

C. Multipurpose Dry-Chemical Type in Steel Container – FE-D: UL-rated 3-A:40-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. (Larsen's MP5-A model or equivalent.)

1. Provide FE-D extinquishers unless otherwise specified in drawings.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 107500 - FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-mounted flagpoles made from aluminum.

B. Owner-Furnished Material: Flags.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
   1. Wind Loads: 130 m.p.h. and exposure “B” according to SEI/ASCE 7.
   2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

   1. Include manufacturer’s standard color sheet for initial finish selection.

B. Shop Drawings: For flagpoles. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.

   1. Include section, and details of foundation system for ground-mounted flagpoles.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For qualified professional engineer.

F. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Flagpole; a Kearney-National Inc. company.
2. Atlantic Fiberglass Products, Inc.
3. Baartol Company.
4. Concord Industries, Inc.
5. Eder Flag Manufacturing Company, Inc.
6. Ewing Flagpoles.
7. Lingo Inc.; Acme Flagpole Company Division.
8. Millerbernd Manufacturing Company.
9. Morgan-Francis; Division of Original Tractor Cab Co., Inc.
10. PLP Composite Technologies, Inc.
11. Pole-Tech Company Inc.
12. U.S. Flag & Flagpole Supply, LP.
13. USS Manufacturing Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.

2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: to match height of existing flag poles to be demolished.

1. Contractor to confirm height of flag pole in writing to the Architect before removing demolished flag poles from the site.

C. Aluminum Flagpoles: Provide entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

1. Provide flashing collar of same material and finish as flagpole.
2. Provide steel ground protectors extending 12 inches (300 mm) aboveground and 6 inches (150 mm) belowground for steel flagpoles where flashing collars are not provided.
3. Protect dissimilar metals per manufacturer’s specifications to prevent galvanic action.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum**,** finished to match flagpole.

B. External Halyard : Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous **5/16-inch- (8-mm-) diameter, braided polypropylene halyard** and 9-inch (228-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1. Provide one halyard and one cleat at each flagpole.
2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
3. Provide halyard covers consisting of a 2-inch (50-mm) channel, 60 inches (1500 mm) long, finished to match flagpole.
4. Halyard Flag Snaps: Provide two chromium-plated bronze or stainless steel swivel snap hooks per halyard.

a. Provide with neoprene or vinyl covers.

2.4 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, as specified in Division 03 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.

1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107500

DIVISION 11 – EQUIPMENT (NOT USED)

DIVISION 12 – FURNISHINGS

SECTION 123661 – QUARTZ SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes quartz surfacing countertops.

B. Related Sections include the following:

1. Division 06 Section "Architectural Woodwork" for descriptions of stone types required by this Section.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Each variety of quartz surfacing. Submit manufacturer’s product data, ample warranty form, and fabrication and installation guide.
2. Accessories: Submit manufacturer’s product data and installation instructions.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1. Show field-verified dimensions, quartz surfacing dimentsion, location and dimensions of cutouts, required locations of support and blocking members, edge profiles, and installation details and methods.

2. Identify colors and finishes.

C. Interior Air Quality Submittal:

1. Product Data: For adhesives, documentation including printed statement of VOC content.

D. Qualification Data: For Installer and fabricator.

E. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage stone.

F. Maintenance Data: For stone countertops to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate quartz surfacing countertops similar to that indicated for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of products.

C. Source Limitations for Quartz Surfacing: Obtain each variety of surfacing from a single source.

1.5 WARRANTY

A. Provide manufacturer's ten-year limited warranty against product defects when fabricated and installed by a fabricated certified by the quartz surfacing manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Observe manufacturer's recommendations and handle in manner to prevent breakage and damage. Brace parts if necessary. Transport in a near-vertical position with finished surface towards finished surface. Do not allow finished surfaces to rub during shipping and handling.

B. Store in racks in near-vertical position. Prevent warpage and breakage. Store inside away from direct exposure to sun. Store between 25 and 130 degrees F (-4 and 54 degrees C). Store with finished face towards finished face.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Qualifications: Manufacturer's shall be ISO 9002 and ISO 14001 Certified.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. U.S. Quartz Products Inc. (CeasarStone U.S.A., Inc.)
    b. Dupont.
    c. Hanwha L & C Corporation.

2.2 QUARTZ SURFACING

A. Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process.

B. Basis of Design: Subject to compliance with requirements provide the following quartz surface or a product of listed manufacturer offering products of equivalent quality, design, and pattern, as judged solely by the Architect:

1. Ceasar Stone.

    a. Color: As selected by Architect from manufacturer's full range.
    b. Finish: Polished surface shall have gloss greater than or equal to 35% at 50 degrees.
    c. Finish and Color: As specified in Drawings.

C. Dimensions:

1. Thickness: Nominal ¾ inch (20 mm).
2. Size: Slabs shall be not less than 56.5 x 120 inches (1.44 x 3.05 m) to minimize number of joints in installation.
3. Indentification: Material shall be labeled with batch number and imprinted on back with manufacturer’s identifying mark.

D. Performance:

1. Flextura Strength: 7,420 psi. ASTM C880.
2. Compressive strength: ASTM C-170.
3. Water Absorption: Less than 0.02%.
4. Wear and Cleanability: to Pass ANSI Z124.6.
5. Stain Resistance: To Pass ANSI Z124.6.
6. Mohs Hardness: Quartz = 7 on Mohs Scale.
7. Size: Slabs shall be not less than 56.5 x 120 inches (1.44 x 3.05 m) to minimize number of joints in installation.
8. Indentification: Material shall be labeled with batch number and imprinted on back with manufacturer’s identifying mark.

E. Color and Finish:

1. Provide color and finish selected by Architect from manufacturer’s stocked standard. Allow for the selection of up to two color.

2. Finish: Polished surface shall have gloss greater than or equal to 35% at 50 degrees.
3. Provide product Color and finish specified in drawings or equal by approved manufacturer.
   a. .

F. Exposed Edges:

1. Edges: Square with mitered joint.
2. See drawing edge depth and detail.
3. Provide re-inforcing blocking as recommended by manufacturer.

2.3 ADHESIVES, GROUT, SEALANTS, AND ACCESSORIES

A. General: Use only adhesives formulated for solid surfacing and recommended by their manufacturer for the application indicated.

B. Provide structural-grade silicone or epoxy adhesives of type recommended by quartz surface's manufacturer for application and conditions of use.
1. Available Manufacturers:

   a. Dow Corning.
   b. GE Sealants and Adhesives.
   c. Sika Corporation.

C. Stone Adhesive: 2-part epoxy or polyester adhesive of type recommended by quartz surfacing manufacturer for application and conditions of use.
1. Adhesive formulated specifically for bonding stone to stone, with an initial set time of not more than 2 hours at 70 deg F (21 deg C)**.**
2. VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Color: Adhesive which will be visible in finished work shall be tinted to match quartz surfacing.
4. Available Manufacturers:

   a. Akemi North America.
   b. Axson North America, Inc.
   c. Bonstone Materials Corporation.
   d. Tenax USA.
   e. Epoxy Adhesive: Bonstone Materials Corporation; Touchstone Last Patch.
5. Epoxy Adhesive

D. Joint Sealant:

1. Clear silicone sealant of type recommended by manufacturer for application and conditions of use.
2. Proved anti-bacterial type in toilet rooms and food preparation areas.
3. Available Manufacturers:

a. Dow Corning.
b. GE Sealants and Adhesives.

E. Solvent: Product recommended by adhesive manufacturer to clean surface of quartz surfacing to assure adheasin of adhesives and sealants.

F. Cleaning agents: Non-abrasive, soft-scrub type kitchen cleansers.

G. Stone Joint Splines: Stainless-steel or brass washers approximately 1 inch (25 mm) in diameter and of thickness to fit snugly in saw-cut kerf in edge of stone units.

2.4 FABRICATION, GENERAL

A. Fabricator: Firm shall have five years experience fabricating architectural stone and shall have water-cooled cutting tools.

B. Shop Assembly: Observe proper safety procedures and comply with manufacturer's instructions.

C. Layout: Layout joints to minimize joints and to avoid L-shaped pieces of quartz surfacing.

D. Inspect Materials:

1. Inspect material for defects prior to fabrication.
2. Color Match: Materials throughout Project shall be from the same batch and shall bear labels with same batch numbers. Visurlally inspect materials to be used for adjacent pieces to assure acceptable color match. Inspect in lighting conditions similar to those of Project.
3. Variation in distribution of aggregates in quartz surfacing which are within manufacturer's tolerances is not a defect.

E. Tools: Cut and polish with water-cooled power tools.

F. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

1. Clean sawed backs of stones to remove rust stains and iron particles.
2. Dress joints straight and at right angle to face, unless otherwise indicated.
3. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
4. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
5. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased, unless otherwise indicated.

6. Finish exposed faces of stone to comply with requirements indicated for finish of each type of stone required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.

G. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

2.5 QUARTZ SURFACING COUNTERTOPS

A. Nominal Thickness: Provide thickness indicated, but not less than **3/4 inch (20 mm)**. Gage backs to provide units of identical thickness.

B. Edge Detail: As indicated.

C. Splashes: Provide 3/4-inch- (20-mm-) thick backsplashes and end splashes, unless otherwise indicated.

1. Height: As indicated.
2. Top-Edge Detail: Straight, slightly eased at corner.

D. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated and as follows:

1. Bonded Joints: 1/32 inch (0.8 mm) or less in width.
2. Grouted Joints: 1/16 inch (1.5 mm) in width.
3. Sealant-Filled Joints: 1/16 inch (1.5 mm) in width.
4. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

E. Cutouts and Holes:

1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   a. Provide vertical edges, rounded to 3/8-inch (10-mm) radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch (5 mm) into fixture opening.

2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Cutouts shall have 3/8 inches (10mm) minimum inside corner radius. Inside corners shall be reinforced in an acceptable manner to prevent cracking.
4. Where edges of cutout will be exposed in finished work, polish edges.
5. If the remaining material outside a cutout is less than 3 inches (76 mm) wide, reinforce area by laminating it with a strip of quartz surfacing.

6. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification:

1. Verify dimensions by field measurements prior to fabrication.
2. Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 1/16 inch in ten feet (1.6 mm in 3000 mm) and that necessary supports and blocking are in place.
3. Base cabinets: Cabinet units shall be securely fixed to adjoining units and back wall.

B. Examine substrates indicated to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.

B. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/16 inch in ten feet (1.6 mm in 3000 mm).

B. Variation from Level: Do not exceed 1/16 inch in ten feet (1.6 mm in 3000 mm). maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.

D. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.

E. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION

A. General: Install materials in accordance to manufacturer's recommendations. Lift and place to avoid breakage.

B. Preliminary Installation and Adjustment: Position materials to verify that materials are correctly sized and prepared. Make necessary adjustments.
   1. If jobsite cutting, grinding, or polishing is required, use water-cooled tools. Protect jobsite and surfaces against dust and water. Perform work away from installation site if possible.
   2. Counter tops: Gypsum drywall back walls, which are not fire or acoustically rated, may be routed out to hlf the thickness of the drywall to allow counter top to fit.
   3. Allow gaps for expansion of not less than 1/16 inch (1.5 mm) per five feet when installed between walls or other fixed conditions.
   4. Drainage: Adjacent to sinks or where drainage is required, shim counter tops slightly to insure positive drainage.

C. Permanent Installation:
   1. After verifying fit, remove quartz surfacing from position, clean substrate of duxt and contaminants, and clean quartz surfacing back side and joint with solvent.
   2. Apply sufficient quantity of mounting adhesive in accordance with adhesive manufacturer's recommendations to provide perminant, secure installation.

D. General: Install countertops over plywood subtops with full spread of water-cleanable epoxy adhesive.

E. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.

F. Do not cut quartz surfacing in field, unless otherwise indicated. If quartz surfacing countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.

G. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight, true, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

H. Set quartz surfacing to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

I. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
   1. Joints shall be flush, tight fitting, level and neat.
   2. Fill joints level with quartz surfacing.
   3. Clamp or brace quartz surfacing in position until adhesive sets.

J. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

K. Install backsplash and end splash by adhering to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Leave 1/16-inch (1.5-mm) gap between splash and wall for filling with sealant. Use temporary shims to ensure uniform spacing.

L. Apply sealant to joint; comply with Division 07 Section "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Remove and replace countertops of the following description:

   1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
   2. Defective countertops.
   3. Defective joints, including misaligned joints.
   4. Interior stone countertops and joints not matching approved Samples.
   5. Interior stone countertops not complying with other requirements indicated.

C. Protect surfacing from damage by work specified by other sections.

END OF SECTION 123640

DIVISION 13 – SPECIAL CONSTRUCTION (NOT USED)

DIVISION 14 – CONVEYING SYSTEMS (NOT USED)

DIVISION 21 – FIRESUPPRESSION

SECTION 210000 - FIRE PROTECTION SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. The General Conditions of the Contract and Supplementary Conditions of the Contract shall govern the work under this Section of the Specifications. The Contractor is specifically directed to refer to said conditions.

B. It is understood that these specifications, and the accompanying drawings, complement complete apparatus, fully erected and in successful operating condition. All work must be preformed in the best and most substantial manner.

C. These specifications are intended to provide complete, and in proper operation, all sprinkler system piping, equipment, heads, valves, controls, air compressor, and accessories, all as specified herein or shown on the accompanying drawings, or reasonably implied in either. The building shall be provided with complete coverage sprinkler system for the spaces designated on the drawings classification as required. System shall consist of a calculated dry system unless indicated otherwise. Verify all pertinent criteria. The systems shall conform to layout shown and meet all requirements of agencies listed under "REGULATIONS AND STANDARDS" below. Refer to plans and specifications for additional information.

D. Pipe, fittings, valves, and connections for fire protection and sprinkler systems shall be furnished by fire protection contractor.

1.2 RELATED WORK:

A. Section 211313 - Wet-pipe Sprinkler Systems.

1.3 SYSTEM LAYOUT:

A. Where plans indicate layout of system components, the layout shall be verified to comply with "REGULATIONS AND STANDARDS" and shall be revised if required to comply. The location of the sprinkler system piping and components shall be coordinated with all other trades. Revisions to sprinkler system layout shall be at Sprinkler Contractor's expense. Any such revisions shall be verified with the Architect.

1.4 ELECTRICAL WORK:

A. See "COORDINATION".

1.5 SPRINKLER SYSTEM CONTRACTOR:

A. It is intended that the work under this section is to be preformed by a qualified Fire Protection Piping Systems Contractor regularly engaged in this type of work. The Contractor is to hold a current license to perform this work and be certified by the State Fire Marshall. All documents shall bear this certification.

1.6 REGULATIONS, STANDARDS AND REFERENCES:

A. It is the intention of these specifications and the accompanying drawings, that all elements and features of the fire protection system shall be in accordance with the standards of the National Fire Association (NFPA), the State Fire Marshall, all applicable building codes and Property Insurance Association of Louisiana whether so indicated or not. NFPA standards are on file in office of Engineer and may be examined at the Contractor's request.

B. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 150.

C. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings, Class 150. Interior of building.

D. Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.

E. NFPA 13 - Installation of Sprinkler Systems.

F. NFPA 14 - Standpipe and Hose Systems.

1.7 QUALITY ASSURANCE:

A. Conform to NFPA 13 for sprinkler systems.

B. Conform to NFPA 14 for standpipe hose systems.

C. Welding Materials and Procedures: Conform to ASME Code.

D. Employ certified welders in accordance with ANSI/ASME Section 9. AWS D10.9.

E. Valves: Bear UL FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

1.8 SUBMITTALS:

A. Submit product data under provisions of section 01300.

B. Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals.

C. Indicate valve data and ratings.

1.9 DELIVERY, STORAGE, AND HANDLING:

A. Deliver and store valves in shipping containers, with labeling in place, under provisions of Section 016000.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures. Maintain in place until installation.

1.10 AREAS SUBJECT TO FREEZING:

A. For areas requiring protection and not receiving direct heating during times of potential freezing, such as building overhangs, porches, canopies, attics, etc. provide a compressed air dry pipe system for these areas only, see drawings for locations. Coordinate electrical requirements with contractor.

1.11 MANUFACTURER'S OR TRADE NAMES:

A. Where the plans or specifications mention the names of manufacturers or the products of specific manufacturers, it is intended that the Contractor shall furnish the item or items as specifies. Products of manufacturers that are not mentioned shall be subject to prior review by the Engineer and shall in any case mentioned shall be subject to prior review by the Engineer and shall in any case be in accordance with regulations and standards as state above.

1.12 SHOP DRAWINGS AND SUBMITTAL DATA:

A. Within fifteen (15) days of award of the contract, the contractor shall submit six (6) copies of system piping shop drawings and six (6) copies of manufacturer's data and descriptive literature and drawings for all equipment and materials. Additionally, provide a reproducible (sepia) copy of the system piping shop drawings. All drawings, literature and data on all equipment shall be submitted at the same time; this material shall contain complete layout, capacity data, dimensions and other pertinent information necessary for the Architect to properly review and evaluate the item that necessary to meet the requirements for submittal to the State Fire Marshall.

B. The contractor shall obtain approval of agencies listed under "REGULATIONS AND STANDARDS" before submitting to the Engineer, except that the date for State Fire Marshall's review shall be submitted to the Engineer prior submitting to the Fire Marshall. All required review fees and applicable requirements shall be by the contractor. No item of equipment or material shall be place on order until Final Review comments have been received from the Architect. See "DRAWINGS" below.

1.13 ORDINANCES, RULES AND REGULATIONS:

A. All material and construction shall conform to the requirements of all building, plumbing and sanitary codes and laws in force in the locality in which the work is to be done. All materials and construction shall also conform to the rules and regulations listed above under "REGULATIONS AND STANDARDS".

1.14 DRAWINGS:

A. The contractor shall submit detailed drawings for all sprinkler system showing exact locations and sizes of all elements in the system before fabrication is begun. Engineer shall have the prerogative of changing the position or configuration of these systems without changing the total scope of work involved to comply with “REGULATIONS AND STANDARDS".

1.15 GUARANTEE:

A. The contractor shall guarantee all materials and workmanship under this contract for a period of one (1) year from date of final acceptance of his work and shall repair or replace any such defective materials and workmanship without cost to the Owner.

B. The guarantee shall include complete service, including adjustment service and inspection, during the guarantee period as required by agencies listed under "REGULATIONS AND STANDARDS".

1.16 APPROVAL OF PRODUCT PRIOR TO BIDDING

A. Refer to Instructions to Bidders.

PART 2 - PRODUCTS

2.1 PIPE AND TUBE:

A. See Section - 211313 Wet-pipe Sprinkler System

2.2 PIPE FITTINGS:

A. Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded. ANSI/ASME B16.25, buttweld ends. ASTM A234, wrought carbon steel and alloy steel. ANSI/ASME B16.5,steel flanges and fittings. ANSI/ASME B16.11, forges steel socket welded and threaded.

B. Cast Iron Fittings: ANSI/ASME B16.1,flanges and fittings. B16.4, screwed fittings.

C. Malleable Iron Fittings: ANSI/ASME B16.3, screwed type. ANSI/ASTM A47.

2.3 JOINT MATERIALS:

A. Solder: ANSI/ASTM B32, 95/5 alloy.

B. Brazing: ANSI/AWS A5.8.

C. Threaded Joint Compound.

2.4 UNIONS, FLANGES, AND COUPLINGS:

A. Unions: 150 psi malleable iron for threaded ferrous piping.

B. Flanges: 150 psi forges steel slip-on flanges for ferrous piping.

2.5 ACCEPTABLE MANUFACTURER - GATE VALVES:

A. Nibco 637-31

B. Central 722 U Series

C. Substitutions: Under provisions of Instructions To Bidders.

2.6 GATE VALVES:

A. Bronze, rising stem, inside screw, solid wedge.

2.7 ACCEPTABLE MANUFACTURERS - GLOBE OR ANGLE VALVES:

A. Nibco GS-132-U

B. Crane 143

C. Substitutions: Under provisions of Instructions To Bidders.

2.8 GLOBE OR ANGLE VALVES:

A. Bronze, rising stem, inside screw, renewable composition disc.

2.9 ACCEPTABLE MANUFACTURERS - CHECK VALVES:

A. NIBCO CS-172

B. Crane 147

C. Substitutions: Under provisions of Instructions To Bidders.

2.10 CHECK VALVES:

A. Iron body, bronze trim, swing disc, renewable disc and seat.

2.11 ACCEPTABLE MANUFACTURERS - BUTTERFLY VALVES:

A. Nibco LD 3510-2 Series

B. Central Fig. 570 or 580

C. Substitutions: Under provisions of Instructions To Bidders.

2.12 BUTTERFLY VALVES:

A. Iron body, bronze stainless steel disc and stem extended for insulated work, resilient replaceable liner seat.

2.13 ACCEPTABLE MANUFACTURERS - DRAIN VALVES:

A. Nibco F-667-0 Series

B. Central 722 U Series

C. Substitutions: Under provisions of Instructions To Bidders.

2.14 DRAIN VALVES:

A. Brass ball valve with cap and chain, 3/4 inch (19 mm) hose thread.

2.15 VALVE OPERATORS:

A. Provide handwheels for gate, globe or angle, and drain valves.

B. For butterfly valves provide gear operators for sizes 8 inches and larger. For smaller sizes provide level lock handle with toothed plate.

2.16 VALVE CONNECTIONS:

A. Provide valve connections to match pipe joints. Use valves of pipe size.

B. For copper tube, provide threaded solder adapters for connection to valve.

C. Provide butterfly valve with tapped lug body when used for isolating service.

2.17 SIAMESE FIRE DEPARTMENT CONNECTIONS:

A. Provide two-way standard siamese fire department connection with chrome plated finish, local fire department threads, dust caps and chains, 3/4" automatic drip, marked "SPRINKLER - FIRE DEPARTMENT CONNECTION:.

2.18 ACCEPTABLE MANUFACTURERS - SPRINKLER HEADS:

A. Reliable Automatic Sprinkler

B. Viking Corp.

C. Tyco-Fire

D. Substitutions: Under provisions of Instruction To Bidders.

PART 3 - INSTALLATION

3.1 GENERAL:

A. Furnish and install in a neat workmanlike manner, all piping shown on drawings or that is specified or required to provide a complete, properly operating installation. All piping and accessories shall conform to standards as applicable.

B. Run piping parallel with the lines of the building, unless specifically shown or noted otherwise. All pipe, fittings, valves, etc., shall have sufficient clearance from other work to finish at least 1/2 inch from other work or finished covering of other piping.

C. Provide all necessary hangers, anchors, thrust blocks, etc., to properly support and protect piping system, as required by agencies listed under "REGULATIONS AND STANDARDS".

D. Under no circumstances is the contractor to attach to or support from any bar joist bridging. Any supports to the bar joists or any structural systems are to be approved by the Architect/Engineer. All supplement angle or channel iron required to support equipment of this specification is to be furnished by the contractor and is to be independent of any other supports.

3.2 DESIGN:

A. The sprinkler systems shall be designed as required for occupancies specified by experienced personnel have competency in the execution of such work. Sprinkler system design shall be performed only by licensed sprinkler contractors.

B. Sprinkler piping shall be protected from freezing during the lay-a-way period.

C. NFPA rules and regulations governing the design shall be scrupulously adhered to.

D. Piping shall be installed in accordance with NFPA 13.

3.3 EXECUTION:

A. Run piping concealed above furred ceiling and in joists to minimize obstructions. Expose only heads.

B. Coordinate sprinkler piping routing and heads with all trades.

C. Protect sprinkler heads against mechanical injury.

D. Include all costs of shop drawings review and approval from authorities in price.

E. Locate outside alarm on wall of building adjacent to siamese department connections.

F. Provide cabinet containing required number of spare heads as per NFPA 13, of each type, along with wrench suitable for each type of head.

G. Provide flow switch on leaving side of main valve and monitoring switch on main valve. Flow switch shall sense flow and sound appropriate zone of fire alarm system monitoring switch on each main valve; when valve is started to its "closed" position shall indicate trouble on appropriate zone of fire alarm system and sound local audible alarm. Wiring between flow switches and monitoring switches and fire alarm system shall be provided under the Electrical Division.

H. Furnish and install sprinkler zone valves and flow switches where indicated on the drawings for the zoning of the system. Each of these devices shall be connected into the fire alarm system as indicated for the main valve, including local alarming.

I. Provide all test and drain valves as required per NFPA 13.

J. Support sprinkler piping in accordance with NFPA 13.

K. Provide new water service as shown on the drawings.

L. Install air compressor on vibration isolators, as required.

M. Screw joint steel piping up to and including 1-1/2 inch diameter. Screw or Roll Goove 2 inch diameter and larger. PER NFPA 13.

N. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

O. Coat threaded ends with pipe lubricant compound.

P. Steel piping, main sized saddle branch connections or direct connection of branch lines to mains is permitted if main is one pipe size larger than the branch for up to 6 inch mains and if main is two pipe sizes larger than branch for 8 inch and larger mains.

Q. Solder Braze copper tubes.

R. Install piping in accordance with NFPA 13 for sprinkler systems and NFPA 14 for standpipe and hose systems.

S. Do not penetrate building structural members unless indicated.

T. Provide sleeves when penetrating footings floors and walls.

U. Seal pipe and sleeve penetration to achieve fire resistance equivalent to fire separation required.

3.4 INSTALLATION - VALVES:

A. Install valves with stems upright or horizontal, not inverted.

B. Provide gate valves for shut-off or isolating service.

C. Where approved, butterfly valves may be used instead of gate valves.

D. Provide drain valves at main shut-off valves, low points of piping and apparatus.

3.5 SLEEVES AND PLATES:

A. Wherever pipes pass through concrete slabs, furnish and install sleeves, properly located for the work.

B. Use sleeves of sufficient size to allow the specified pipe covering to pass through the sleeves and finish sleeves flush with walls and ceiling.

C. Sleeves shall be galvanized steel not lighter than 24 gauge.

D. Seal spaces between sleeve and pipe. Use packing device or material for UL rating to match rating of wall or floor/ceiling as rated under UL File R9658.

3.6 ESCUTCHEONS:

A. Where pipes passing through floors, walls or ceiling exposed to view in finished areas, provide pressed steel split plates which cover the opening and fit snugly to pipe.

3.7 COORDINATION:

A. All interlock and signal wiring runs to the annunciator panel will be furnished and installed and as part of the Electrical Work.

B. This contractor shall provide for all switches and interlocking devices on all valves as required.

3.8 UNDERGROUND PIPING:

A. Underground fire protection system piping shall be installed in accordance with the requirements of NFPA 24, Private Fire Service Mains and Their Appurtenances. Provide concrete thrust blocking at each change of direction of the piping and at all tees, plugs, and caps in accordance with NFPA 24. Where thrust blocking is impractical, fittings with a mechanical joint retainer gland, approved for the piping material utilized, may be used in

lieu of thrust blocking.

END OF SECTION 210000

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Revision of existing sprinkler piping & head location for renovated building areas.

B. Installation of new sprinkler and related piping systems in new construction.

1.2 WORK INSTALLED BUT SPECIFIED UNDER OTHER SECTIONS

A. Section - Fire Protection Piping: Piping and valves.

1.3 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS:

A. Furnish sleeves to General Contractor.

1.4 RELATED WORK:

A. Section 230529 - Supports and Anchors.

1.5 REFERENCES:

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volt maximum).

B. NFPA 13 - Installation of Sprinkler Systems.

1.6 SYSTEM DESCRIPTION:

A. System to provide coverage for entire new building area.

B. Interface system with building control system. Building fire and smoke alarm system.

C. Provide system per NFPA 13 hazard requirement.

1.7 QUALITY ASSURANCE:

A. Design and installation to conform to NFPA 13.

B. Equipment and components: Bear UL FM label or marking.

C. Specialist Firm: Company specializing and licensed in sprinkler systems.

1.8 REGULATORY REQUIREMENTS:

A. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of Fire Marshal.

B. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories.

C. Submit shop drawings product data hydraulic calculations to Fire Marshal. Submit proof of approval to Architect. Include check for review fee with submittal to Fire Marshal's office.

1.9 PROJECT RECORD DOCUMENTS:

A. Submit documents under provisions of Section 017839.

1.10 OPERATION AND MAINTENANCE DATA:

A. Submit manufacturer's operation and maintenance data under provisions of Section 017823.

B. Include written maintenance data on components of system, servicing requirements, and record drawings.

C. Include maintenance, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.11 DELIVERY, STORAGE, AND HANDLING:

A. Deliver and store materials in shipping containers with labeling place under provisions of Section 016000.

B. Provide suitable wrenches for each head type.

C. Maintain caps in place until installation.

1.12 EXTRA STOCK:

A. Provide extra sprinkler heads under provisions of NFPA 13.

B. Provide suitable wrenches for each head type.

C. Provide storage cabinet.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

A. Above Ground Inside Building Piping: Pipe diameter smaller than and up to 2" shall be Steel Schedule 40 pipe, Pipe diameters 2-1/2" and larger shall be Steel Schedule 10 or Steel Schedule 40 pipe, As permitted by NFPA 13.

2.2 ACCEPTABLE MANUFACTURERS - SPRINKLER HEADS:

A. Reliable Automatic Sprinkler

B. Viking Corp.

C. Tyco-Fire

D. Substitutions: Under provisions of Instruction To Bidders.

2.3 SPRINKLER HEADS:

A. Exposed Area Type: Standard upright type with brass finish.

B. Sidewall Type: Brass Chrome plated finish with matching escutcheon.

C. Fusible Link: Temperature rated for specific area hazard.

D. Guards: finish to match sprinkler head.

E. Finished ceilings: Pendent sprinklers - concealed type with white cover plates. Unless otherwise noted on plans.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Place pipe runs to minimize obstruction to other work.

3.2 INSTALLATION:

A. Run piping concealed above furred ceiling and in joists to minimize obstructions. Expose only heads.

B. Coordinate sprinkler piping routing and heads with all trades.

C. Protect sprinkler heads against mechanical injury.

D. Include all costs of shop drawings review and approval from authorities in price.

E. Locate outside alarm on wall of building adjacent to siamese fire department connections.

F. Provide cabinet containing required number of spare heads as per NFPA 13, of each type, along with wrench suitable for each type of head.

G. Provide flow switch on leaving side of main valve and monitoring switch on main valve. Flow switch shall sense flow and sound appropriate zone of fire alarm system monitoring switch on each main valve; when valve is started to its "closed" position shall indicate trouble on appropriate zone of fire alarm system and sound local audible alarm. Wiring between flow switches and monitoring switches and fire alarm system shall be provided under the electrical division.

H. Furnish and install sprinkler zone valves and flow switches where indicated on the drawings for the zoning of the system. Each of these devices shall be connected into the fire alarm system as indicated for the main valve, including local alarming.

I. Provide all test and drain valves as required for system per NFPA 13.

J. Support sprinkler piping in accordance with NFPA 13.

K. Provide new water service as shown on the drawings.

3.3 CLEANING:

A. Flush entire piping system of foreign matter.

3.4 SYSTEM TESTS:

A. Hydrostatically test entire system.

B. Test shall be witnessed by Fire Marshal and Architect.

END OF SECTION 211313

DIVISION 22 – PLUMBING

SECTION 220700 - PIPING AND EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Piping Insulation

B. Jackets and Accessories

C. Equipment Insulation

D. Duct Insulation

1.2 RELATED WORK

A. Section 230553- Mechanical Identification

1.3 REFERENCES

A. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation

B. ANSI/ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.

C. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate

D. ASTM E845 - Surface Burning Characteristics of Building Materials.

E. NFPA 255 - Surface Burning Characteristics of Building Materials.

F. UL 723 - Surface Burning Characteristics of Building Materials.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in application of piping insulation.

B. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50/50 in accordance with ASTM E84, NFPA 255.0, UL 723.

1.5 SUBMITTALS

A. Submit product data for each application as per Section 013300.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 INSULATION

A. After all work has been tested and found to be leak free and tight, and accepted by the Architect, insulate as follows:

1. All domestic hot and cold piping above ground shall be covered with 1" thick fiberglass, molded type sectional pipe covering complete with FRJ jacket. Sections of pipe covering shall be joined together, the mastic to be buttered on only one of the two adjoining surfaces at both the Longitudinal and circumferential joints so that a complete seal at the joints is obtained. The piping insulation will be secured in place with copper wire spaced not more than 12 on center.
2. Insulate the square to round connections on each air handling unit with 2" thick 3/4 lb. density insulation. Insulation board shall have aluminum vapor barrier.
3. All round and flat oval supply air ducts shall be wrapped with 2" thick, 3/4 lb. density fiberglass insulation with reinforced aluminum vapor barrier. Seal all joints with 2" duct tape.
4. Insulate cooling coil condensate drain lines from air handling units with 2“ thick aerotube type insulation tied on and sealed over with tape.
5. Insulate back of all ceiling diffusers with 2" thick fiberglass with reinforced aluminum vapor barrier.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install materials in accordance with manufacturer's instructions.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Continue insulation with vapor barrier through penetrations.

C. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

D. Neatly finish insulation at supports, protrusions, and interruptions.

END OF SECTION 220700

SECTION 221000 - PLUMBING PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe and Pipe Fittings

B. Valves

C. Sanitary Sewer Piping System

D. Domestic Water Piping system

E. Service Connections

1.2 RELATED WORK

A. Section 230000 - General Provisions

B. Section 230516 - Expansion Compensation

C. Section 230529 - Supports and Anchors

D. Section 220700 - Piping Insulation

E. Section 221000 - Plumbing Specialties

F. Section 224000 - Plumbing Fixtures and Trim

1.3 REFERENCES:

A. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 NS 300.

B. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

C. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

D. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications.

E. ANSI/ASTM B32 - Solder Metal.

F. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

G. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

H. ASTM A74 - Cast Iron Soil Pipe and Fittings.

I. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

J. ASTM B88 - Seamless Copper Water Tube.

K. ASTM B306 - Copper Drainage Tube (DWV).

L. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

M. AWS A5.8 - Brazing Filler Metal.

N. AWWA C601 - Standard Methods for the Examination of Water and Waste Water.

O. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary System.

P. CISPI 310 – Standard for cast iron couplings

Q. LSPC – The latest addition of the Louisiana State Plumbing Code.

1.4 QUALITY ASSURANCE:

A. Valves: Manufacturer's name and pressure rating market on valve body.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with ANSI/ASME Sec. 9. ANSI/AWS D 1.1.

D. Cast iron pipe and fittings shall be marked with CISPI's collective trademark.

1.5 SUBMITTALS:

A. Submit shop drawings and product data under provisions of Section 013300.

B. Include data on pipe material, pipe fittings, valves and accessories.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING - BURIED BEYOND 5 FEET OF BUILDING:

A. Schedule 40 PVC/DWV
Fittings: Same as piping
Joints: Solvent welded

2.2 SANITARY SEWER PIPING - BURIED WITHIN 5 FEET OF BUILDING:

A. Schedule 40 PVC/DWV
Fittings: Same as piping
Joints: Solvent welded

2.3 SANITARY SEWER PIPING, ABOVE GRADE:

A. Schedule 40 PVC/DWV
Fittings: Same as piping
Joints: Solvent welded

2.4 WATER PIPING, ABOVE GRADE: Exterior water piping buried beyond 5' of building to be same as above grade.

A. Copper Tubing: ASTM B88, Type L, hard drawn.
Fittings: ANSI/ASME B16.26, cast brass, or ANSI/ASME B16.22, wrought copper.

2.5 WATER PIPING, TRAP PRIMERS: Piping for trap primer piping below slab only.

A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.

2.6 FLANGES, UNION, AND COUPLINGS:

A. Pipe Size two (2) Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, solder joints.

B. Pipe Size Over two (2) Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service.

C. Dielectric Connections: Unions with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.7 GATE VALVES

A. Up to two (2) Inches: Bronze body, non-rising or rising stem and handwheel, inside screw, single double wedge or disc, solder or threaded ends. Nibco Model 113 Series, Crane Model 438 Series, Powell Model 2700, Hammond 2B 617 or approved equal.

B. Over two (2) Inches: Iron body, bronze trim, non-rising or rising stem and handwheel, OS&Y, single wedge, flanged ends. Red and White 415/421, NIBCO F619/F617, Crane 461/465 1/2 or approved equal.

2.8 GLOBE VALVES:

A. Up to 2 Inches: Bronze body, rising stem and handwheel inside screw, renewable composition disc, solder screwed ends, with backseating capacity. Nibco Model 211 Series, Crane Model 1 Series, Powell Model 150, Hammond 1.413, Red White 211/212 or approved equal.

B. Over 2 Inches: Iron body, bronze trim, rising stem and handwheel, OS&Y, plug-type disc, flanged ends. Red and White Fig 400 or NIBCO F718-B, Crane 351 or approved equal.

2.9 BALL VALVES:

A. Up to 2 Inches: Bronze or stainless steel body, stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, solder threaded ends with union. Nibco Model 580 Series, Crane Model 2330 Series, Red White 5092/5095 or approved equal.

B. Over 2 inches: Cast steel body, chrome plated steel ball teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches and over, flanged.

2.10 BUTTERFLY VALVES:

A. Iron body, bronze disc, resilient replaceable seat for service to 180-degrees F, or lug end butterfly, 10 position over handle or infinite position lever handle with memory stop.

2.11 SWING CHECK VALVES:

A. Up to 2 inches: Bronze 45 degree swing disc, solder or screwed ends. Nibco Model 413 Series, Crane Model 37 Series, Red White 236/237 or approved equal.

B. Over 2 inches: Iron body, bronze trim, 45 degrees swing disc, renewable disc and seat, flanged ends. Red White 435, Nibco F918, Crane 373 or approved equal.

2.12 SPRING LOADED CHECK VALVES:

A. Iron body, bronze trim, spring loaded, bronze disc, wafer.

B. Red White 442, Nibco W920W, Stockham W6-970 or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Ream pipe and tube ends. Remove burrs. Bevel end Ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATIONS:

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed.

H. Slope water piping and arrange to drain at low points.

I. Establish elevations of buried piping outside the building to insure not less than 3 feet of cover.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.

L. Establish invert elevations, slope all drainage piping 4 inches and larger to 1/8 inch per foot minimum. All drainage piping 3 inches and smaller shall be sloped to 1/4 inch per foot minimum.

M. Install bell and spigot pipe with bell end upstream.

N. Install valves with stems upright or horizontal, not inverted.

O. Provide one plug cock wrench for every ten plug cocks sized 2 inches and smaller, minimum of one. Provide one plug cock wrench for each plug cock sized 2-1/2 inches and larger.

3.3 APPLICATION:

A. Grooved mechanical couplings and fasteners not allowed.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe. All joints in potable lines to be lead free.

D. Install gate, ball, butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install globe, ball, butterfly valves for throttling, bypass, or manual flow control services.

F. Provide spring loaded check valves on discharge of water pumps.

3.4 TEST

A. Upon completion of the domestic water piping system, if shall be tested and proved tight under a water pressure not less than 200 psi. The water used for testing shall be obtained from a potable source of supply. This pressure test shall be performed before the disinfection of the domestic water piping system is started. This test shall conform to the Louisiana State Plumbing Code

B. Upon completion of the sanitary sewer piping system the contractor shall perform a water test to prove that the system is tight and with out leaks. No section of the piping system shall be tested with less than 10 ft head of water. The pressure shall be kept on the system for a time no less that 1 hour. This test shall conform to the Louisiana State Plumbing Code.

C. Upon completion of the sanitary vent piping system the contractor shall perform a pressure test to prove that the system is tight and is with out leaks. This test shall conform to the Louisiana State Plumbing Code.

D. Prior to any test the contractor shall inform the architect in writing the date and time the test will take place. After the completion of the test but before the building is substantially complete the contractor shall submit a written report with the following information for each test performed.

1. Project Name
2. Project Location
3. Plumbing Contractor Name, Address and Contact Information
4. Identification of test performed.
5. Time and Date test was started
6. Time and Date test was completed.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM:

A. Prior to starting work, verify system is complete, flushed and clean.

B. Option 1

1. The system shall be filled with a solution containing 50 ppm of available chlorine and allowed to stand 6 hours before flushing and returning to service.

C. Option 2

1. The system shall be filled with a solution containing 100 ppm of available chlorine and allowed to stand 2 hours before flushing and returning to service.

D. Prior to the disinfection of the domestic water piping system the contractor shall inform the

architect in writing the date and time the disinfection will take place. After the completion of the disinfection of the domestic water piping system but before the building is substantially completed the contractor shall submit a written report with the following information.

1. Project Name
2. Project Location
3. Plumbing Contractors Name, Address, and contact information
4. Chemicals used in the disinfection process.
5. Time and Date disinfection process was started
6. Time and Date disinfection process was completed

3.6 SERVICE CONNECTIONS:

A. Provide new sanitary sewer and tie into services as shown on plans. Before commencing work check invert elevations required for sewer connections, confirm inverts and insure that these can be properly connected with slope for drainage and cover to avoid freezing. Contractor to tie in existing services as shown on drawings.

B. Tie domestic water into services as shown on drawings with taps provided by owner. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Provide 18-gauge galvanized sheet metal sleeve around service main to 6 inches above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing. Contractor shall utilize and tie in existing water lines as indicated on the drawings.

END OF SECTION 221000

SECTION 221010 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Floor drains

B. Cleanouts

C. Backflow preventors

D. Water hammer arrestors

E. Hose bibbs hydrants

1.2 RELATED WORK

A. Section 230529 - Supports and Anchors

B. Section 221000 - Plumbing Piping

C. Section 224000 - Plumbing Fixtures

1.3 REFERENCES

A. ANSI/ASSE 1012 - Backflow Preventers with immediate Atmospheric Cent.

B. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.

C. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

D. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

E. ANSI A112.26.1 - Water Hammer Arrestors

F. PDI WH-201 Water Hammer Arrestors

1.4 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 013300.

B. Include component sizes, rough-in requirements, service sizes, and finishes.

PART 2 - PRODUCTS

2.1 FLOOR DRAINS

A. Floor Drain (FD): ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, square adjustable nickel- bonze strainer, and trap primer connection; Wade model 1100G, Zurn model Z415s or Smith model 2005.

B. All floor drains installed shall have trap primers.

2.2 ACCEPTABLE MANUFACTURERS - CLEANOUTS

A. As listed below:
Wade 6000
Zurn 1400

B. Substitutions: Under provisions of Instructions To Bidders.

2.3 CLEANOUTS

A. Exterior Surfaced Areas: As detailed on Plans.

B. Interior Finished Floor Areas: Lacquered cast iron, two piece body with double drainage flange, weep holes, reversible clamping collar, and adjustable nickel- bronze strainer, square with scoriated cover in service areas and square with depressed cover to accept floor finish in finished floor areas; Model W-6000 manufactured by Wade or Model ZN-1400 manufactured by Zurn or 4000 Series manufactured by Smith.

C. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated gasketted cover, and round stainless steel access cover secured with machine screw; Model W-8460-R manufactured by Wade or Model ZN-1445-1 manufactured by Zurn or Model 4532 manufactured by Smith.

D. Interior Unfinished Accessible Areas: Caulked or threaded type provide bolted stack cleanouts on vertical rainwater leaders.

2.4 ACCEPTABLE MANUFACTURERS - BACKFLOW PREVENTERS

A. Watts Model 909

B. Wilkins Model 375

C. Substitutions: Under provisions of Instructions To Bidders.

2.5 BACKFLOW PREVENTERS

A. Pressure Backflow Preventers: ANSI/ASSE 1013;bronze body with bronze and plastic internal parts and Stainless steel springs; two independently operating,spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve which opens under back pressure in case of diaphragm failure ;non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.6 ACCEPTABLE MANUFACTURERS - WATER HAMMER ARRESTORS

A. Wade Model W-5, W-10, W-20

B. Zurn Model Z-1700-100, 200, 300

C. Smith Model 5000

D. Substitutions: Under provisions of Instructions To Bidders.

2.7 WATER HAMMER ARRESTORS

A. ANSI A112.26.1; sized in accordance with PDI WH-201, precharged suitable for operation in temperature range - 100 to 300 degrees F (-73 to 49 Degrees C) and maximum 250 psig (1700 kpa) working pressure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate cutting forming of roof floor construction to receive drains to required invert elevations.

3.2 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to permit intended performance.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Insure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install water hammer arrestors complete with accessible isolation valve.

END OF SECTION 221010

SECTION 224000 - PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Plumbing Fixtures and Trim

1.2 RELATED WORK

A. Section 230000 - General Mechanical

B. Section 221000 - Plumbing Piping

C. Section 221010 - Plumbing Specialties

1.3 SUBMITTALS

A. Furnish and install plumbing fixtures as shown on the accompanying drawing and in accordance with the approved rough-in drawings. This will include service sinks, lavatories, water closets, urinals, etc., with all brass in connection with supply tubing, traps, escutcheons, stop and basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated and in perfect condition.

B. All brass must be best quality. All brass pipe to be seamless brass tubing and all fixture traps shall be heavy with C.O. plugs. Nipples shall be extra heavy. Lightweight goods will not be accepted. All exposed metal on fixtures shall be C.P. or Chromard. All "P" traps shall be complete with cleanout plug.

C. Contractor shall submit in his fixture brochure for approval, a rough-in sheet of each fixture and indicate any variation required for the fixtures. Fixtures are to be roughed-in in accordance with these approved rough-in sheets and anchored so that piping cannot be moved.

1.4 JOB CONDITIONS

A. Check millwork shop drawings. Conform location and size of fixtures and openings before rough-in and installation.

PART 2 – PRODUCTS – see plans

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install furnish and install all plumbing fixtures and accessories according to manufacturer's instruction and according to national, state and local codes governing the various systems. Carefully review the Architectural floor plans and millwork details to determine exact number of all fixtures, outlets, and accessories required. Coordinate all fixtures, outlets, drains, accessories, etc., prior to submitting shop drawings.

B. Install each fixture in accordance with rough-in drawings as per manufacturers recommendations. At completion thoroughly clean plumbing fixtures and equipment. Anchor fixtures rigidly; anchor piping in walls so that piping cannot be moved.

C. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers and escutcheons.

D. Solidly attach floor water closets to floor with lag screws and finishing caps.

E. Install each fixture with trap, easily removable for servicing and cleaning.

F. Mount fixtures to the following heights above finished floor:

1. Water Closets:

a.	Standard	15" to top of bowl rim
b.	Handicapped	18" to top of seat

2. Urinal:

a.	Standard	22" to top of bowl rim

3. Lavatories:

a.	Handicapped	34" to top of basin rim

4. Water Closet Flush Valves:

a.	Standard	11" min. above bowl rim

3.2 FIXTURE ROUGH-IN SCHEDULE:

A. Rough-in fixture piping and size connections shall be in accordance with the following table of minimum sizes for particular fixtures unless noted different on the drawing:

PLUMBING FIXTURE ROUGH-IN SCHEDULE

DESCRIPTION	C.W.	H.W.	WASTE	VENT
WATER CLOSET (TANK)	½"	–	4"	3"
WATER CLOSET (FLUSH VALVE)	1"	--	4"	3"
URINAL (FLUSH VALVE)	3/4"	--	2"	1-1/2"
LAVATORY	½"	--	2"	1-1/2"
SERVICE SINK	½"	½"	3"	2"
ELECTRIC WATER COOLER	½"	--	2"	1-1/2"
SINK	½"	½"	2"	1-1/2"
HOSE BIBB	3/4"	--	--	--
2" FLOOR DRAIN	--	--	2"	1-1/2"
3" FLOOR DRAIN	--	--	3"	2"
3" HUB DRAIN	--	--	3"	2"

WATER PIPE SIZING TABLE

UNLESS SHOWN OTHERWISE, DOMESTIC WATER LINES SHALL RUN CONCEALED OVERHEAD AS DESIGNATED IN PLUMBING FIXTURE SCHEDULE AND BE SIZED ACCORDING TO TABLE BELOW.
PLANS AND RISER DIAGRAMS DO NOT NECESSARILY SHOW ALL PIPING RUNS. INSTALL A FACTORY SHOCK ABSORBER AT TOP OF EACH FIXTURE GROUP AND ALSO AT WATER HEATERS.

NUMBER OF FIXTURES*	PIPE SIZE (IPS)
2 OR LESS	1/2"
3 TO 5	3/4"
6 TO 10	1"
11 TO 15	1-1/4"
16 TO 28	1-1/2"

*FLUSH VALVE WATER CLOSET IS EQUIVALENT TO SIX (6) FIXTURES SIZES INDICATED ABOVE ARE MINIMUM SIZES TO BE USED UNLESS OTHERWISE STATED

END OF SECTION 224000

DIVISION 23 – HVAC

SECTION 230000 - GENERAL MECHANICAL

PART 1 - GENERAL CONDITIONS

1.1 WORK INCLUDED

A. The general conditions of the general specifications are made a part of these specifications and apply the same as if attached hereto. The contractor should, before bidding, read and thoroughly understand all general conditions, priority and scheduling.

1.2 SCOPE OF WORK

A. This section calls for the furnishing of labor, materials, equipment, and all the services, and of performing all operations required for the complete mechanical systems as hereinafter specified and/or shown on the accompanying drawings.

1.3 GENERAL REQUIREMENTS

A. Contractor shall install his work to meet the existing conditions as found at buildings and property, and to accommodate work of other trades. This contractor shall be responsible for timely placing of sleeves in forms before concrete is poured. Cooperate with the general contractor and place pipes and ducts in floors, walls, furred spaces, etc., so there will be no delay. Sheet metal or iron pipe sleeves shall be provided for pipes passing through floors, wall or partitions.

B. Contractor shall furnish and properly install materials, devices, equipment, insulation, controls, appurtenances, etc., mentioned in these specifications and/or shown on plans or required to make a complete and satisfactory installation in working order whether fully shown or not.

C. Contractor should visit the site and acquaint himself thoroughly with conditions governing installation of his work.

D. All other plans shall be checked in relation to these plans so that all conditions will be furnished and installed in this contract to provide complete and satisfactory systems.

1.4 LAWS, RULES, REGULATIONS, FEES, ETC.

A. The entire mechanical work shall comply with rules and regulations of the local and state authorities having jurisdiction including the State Fire Marshal and the State Board of Health. All modifications required by the said authorities at any time shall be made by the mechanical contractor without additional charge. In cases where alterations to or deviations from this specification and accompanying plans are required by the authorities, contractor shall report same to the Architect and obtain his approval before work is started.

1.5 DRAWINGS

A. Plans and detail sketches are submitted to limit, explain, and define structural conditions, specified requirements, pipe sizes, and manner of erecting work. Structural or other conditions may require certain deviations from manner of installation shown, and such deviations shall be made as required, but specified sizes and requirements necessary for satisfactory operation shall remain unchanged.

B. It may be necessary to shift or to change routing of ducts and or piping and this shall be done, but such changes must be referred to Architect for approval before proceeding. Extra charges will not be allowed for these changes.

C. Typical details are shown on plans, and in any cases where Contractor is not certain about the method of installation of this work, he shall ask for details, lack of details will not be an excuse for improper installation.

D. Contractor bidding on this portion of the work must be fully experienced in installations of equal size, complexity and quality. In bidding, he acknowledges that he fully understands the scope of the work and design and has the ability, for the contract price to assemble and install the equipment, piping, and ductwork shown or specified, so as to mold same into a satisfactory workable system and arrangement, without responsibility for capacities and sizes set by these documents.

E. Contractor shall recognize that the amount of information and detail that could be provided in Contract Documents is limitless and could extend into every minute detail, step, sequence, and operation to a point where only workmen would be required, without drawing on ability experience, and ingenuity of the Contractor.

1.6 MATERIALS

A. Where directed by the Architect, Contractor shall submit sample for approval before proceeding.

1.7 STANDARDS

A. In general, standards for products and workmanship shall be as described in each individual section.

B. The standards referred to, except as modified in these specifications shall have full force and effect as though printed in these specifications. These standards are not furnished to bidders for the reason that the manufacturers and trades involved are assumed to be familiar with their requirements. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.

C. Notwithstanding any reference in this section of the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalogue number, such references shall be interpreted as establishing a standard of quality and shall not be construed limiting competition and the Contractor in such cases, may at his option, use any article, device, product, material, fixture, form or type of construction which

in the judgment of the Architect, expressed in writing, is equal to that specified.

1.8 MATERIALS SPECIFIED OR SUBSTITUTED (Prior Approvals)

A. Refer to Instructions to Bidders.

1.9 SHOP DRAWINGS

A. Before proceeding with the work, contractor shall make complete shop and working drawings of such apparatus or connections as directed by the Architect and/or hereinafter specified. These drawings shall show construction details and dimensions of each piece of equipment so drawn.

B. Architects approval of shop drawings shall not relieve the Contractor from responsibility of incorrectly figured dimensions or any other errors in these drawings or specified even though approved by the Architect, shall not relieve this Contractor from furnishing and erecting same.

C. Ten (10) sets of prints of shop drawings shall be submitted to Architect for approval. These prints shall be supplied as part of this contract. Submit all shop drawings at the same time or as soon as practical after award of the contract. No separate items will be accepted.

D. Where laws or local regulations provide that certain accessories such as gauges, thermometers, relief valves and parts be installed on equipment, it shall be understood that such accessories shall be furnished if no specific reference to them is made in the specifications.

1.10 CUTTING AND PATCHING

A. All cutting necessary for this work will be done by this Contractor at his own expense, but all patching shall be done by the General Contractor. No beams or joists shall be cut without prior approval of Architect. After initial resurfacing has been done any further cutting, patching or painting shall be done at the expense of this Contractor.

1.11 INTERFERENCES

A. The drawings are generally diagrammatic and this Contractor shall harmonize his work with that of the different trades so that interferences of the different equipment, piping, etc., shall be installed so as to function properly. In the case where interference develops, the Architect is to state which equipment, piping, etc., is to be relocated regardless of which item was first installed.

1.12 EXCAVATION AND BACKFILL

A. This Contractor shall do all excavating required to lay the specified services and after same have been laid, he shall do all backfilling to the satisfaction of all parties concerned

and shall cart away from the premises all unnecessary dirt, rubbish, etc., as directed. Backfill shall be well tamped. All backfill shall be done according to the “Compaction And Backfill” section of these specifications.

1.13 SPACE REQUIREMENTS

A. Contractor shall check all plans pertaining to this job so as to be fully aware of the space limitations for all various items of equipment. Equipment is not to be bid on, submitted for preliminary approval nor placed on the job if it is so bulky and large that adequate access for proper maintenance and servicing cannot be achieved in the space provided.

1.14 FOUNDATIONS AND SUPPORTS

A. This contractor shall furnish and install foundations and ports of concrete or steel shapes for equipment requiring same, unless specifically indicated otherwise or specified.

B. All floor mounted mechanical equipment shall be mounted on 4" high concrete housekeeping pad unless specifically shown otherwise on plans. Refer to plans for special requirements for foundations and supports.

1.15 HANGERS, ESCUTCHEONS, ETC.

A. See Section 230529.

B. Mechanical Contractor shall furnish and install all thimbles, inserts and other requirements necessary for the support of his equipment and piping. Assist and cooperate with other trades in locating and placing these items.

1.16 PROTECTION OF EQUIPMENT

A. See individual sections for protection of equipment.

B. This Contractor shall at all times take such precautions as may be necessary to properly protect his equipment from damage. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Architect will be sufficient cause for the rejection of the particular piece of equipment in question.

1.17 TESTING

A. All pressure lines, unless elsewhere specified, shall be tested under 150# hydrostatic pressure unless rated pressure is less for a minimum of 5 hours. Contractor shall provide valve at farthest point in line to bleed off air and for inspection.

B. Notice shall be given the Architect before tests are made, the test is not to be drawn off pipes and pipes are not to be covered or insulated until filled pipes have been examined and testing approved by the Architect.

C. In case of defects, they shall be made good to the satisfaction of the Architect and work retested. All such work shall be done by the Contractor with no additional expense to the Owner.

D. Contractor shall make any other such tests as may be called for by the Architect, and all other tests so called for elsewhere in these specifications.

1.18 CLEANING AND ADJUSTING

A. Before receiving final approval from the Architect, the Contractor shall clean out all lines; adjust all valves, control equipment and other equipment. Clean all pipe and equipment and leave the entire installation in good working order. All heaters, fans, grilles, controls, etc., shall be adjusted to perform in correct and satisfactory manner, with sequences, etc., as called for in the specifications hereinafter specified and on plans.

1.19 PAINTING

A. Refer to Section 099100 for painting requirements.

1.20 MOTORS, MOTOR STARTERS AND ELECTRICAL WORK

A. Refer to Section 230513.

B. Motors shall be suitable for voltage indicated on the plans, plus or minus 10% and be designed for constant operation at 40 degrees C ambient, 65 degrees C rise for class A, 90 degrees C rise for Class B, etc. Electrical equipment furnished under this contract shall meet standards as set forth by NEMA and NEC requirements. All electrical equipment shall be UL labeled.

1.21 PARTS LIST AND INSTRUCTION MANUAL

A. See individual sections for specific instructions.

B. This Contractor shall deliver to the Architect three (3) copies of printed instructions relating to operating, proper maintenance and repair parts list indicating the various parts by name, number and diagram for each piece of equipment installed. Test and balance report shall also be included in parts list and instruction manual.

C. The shop drawings, parts list, and maintenance and repair instructions shall be neatly bound in a canvas-covered notebook and turned over to the Architect before acceptance of the work.

1.22 GUARANTEE

A. Contractor shall guarantee materials, equipment and workmanship installed and performed under this contract for a period of one (1) year from date of the final completion

and official acceptance of the contract.

B. He shall furnish free of charge to the Owner all materials and labor necessary to comply with the above guarantee, which shall be based on defective materials and/or workmanship, and on such basis shall be responsible if a deficiency is found, for any adjustment, replacement, or correction which may be necessary to replace the project to first class condition. This guarantee shall include refrigerant charges, but shall not include the changing of filters.

END OF SECTION 230000

SECTION 230513 - MOTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Single phase electric motors.

B. Three phase electric motors.

1.2 RELATED WORK

A. Section 232123 - Pumps.

1.3 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

C. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.

D. ANSI/NEMA MG 1 - Motors and Generators

E. ANSI/NEMA 70 - National Electrical Code

1.4 SUBMITTALS

A. Submit product data under provisions of Sections 013300 & 23000.

B. Submit test results verifying nominal efficiency and power factor for three phase motors larger than 5 horsepower.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 017823.

B. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacture of electric motors for commercial use,

and their accessories, with documented product development, testing, and manufacturing experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 016000.

B. Store and protect products under provisions of Section 016000.

C. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. (For extended outdoor storage, remove motors from equipment and store separately).

1.9 WARRANTY - See General Section 230000.

PART 2 - PRODUCTS

2.1 MOTORS

A. Motors controlled by VFD's shall comply with NEMA MG1, Part 31, Definite Purpose Inverter Fed Motors (withstand repeated voltage peaks of 1600V with rise times of 0.1 microseconds and greater).

B. Starters for single phase motors which are not automatically started shall be manual type with melting alloy thermal overload protection and pilot light. Starters for automatically controlled single phase motors shall be magnetic type with NEMA rated AC magnetic contactor, melting alloy thermal overloads and pilot light.

C. Starters for three phase motors 25 horsepower and below shall be combination type starter/disconnect, full voltage non reversing (FVNR), with magnetic NEMA rated contactors rated for horsepower of motor served, adjustable trip magnetic circuit breaker disconnect (circuit breaker, not a fused switch) capable of being padlocked in the open position, 10K a/c minimum fault rating with higher rating when necessary due to available faut levels. Starters shall have a fused 100VA minimum control transformer (120V unless required otherwise), HOA switch, push to test operating pilot light, solid state overload relays set for actual motor nameplate full load amps, phase failure and phase reversal protection relay, minimum two NO. and two N.C auxiliary contracts and terminal blocks factory prewired for field wiring. Starters shall be housed in a NEMA 1 enclosure for indoor locations and NEMA 3R enclosure for outdoor or wet locations..

D. Starter for motors 30 horsepower and above shall be soft start type or variable frequency drives

E. Coordinate with electrical and specify fault rating on all motor controllers.

2.2 MANUFACTURERS

A. Electrical Service - Refer to Division 16 for required electrical characteristics.

B. Motors: Design for continuous operation in 40 degrees C environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor, and motor enclosure type.

C. Visible Nameplate: Indicating motor information as required by NEC 430-7(a).

D. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide screwed conduit connection in end frame.

2.3 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A. Starting Torque: Exceeding one fourth of full load torque.

B. Starting Current: Up to six times full load current.

C. Multiple Speed: Through tapped windings.

D. Open Drip-proof or Enclosed Air Over Enclosure: Class A 65 degree C temperature rise insulation, Minimum 1.15 service factor, pre-lubricated sleeve or ball bearings, automatic reset overload protector.

2.4 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.

B. Starting Current: Less than five times full load current.

C. Pull-up Torque: Up to 350 percent of full load torque.

D. Breakdown Torque: Approximately 250 percent of full load torque.

E. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

F. Drip-proof Enclosure: Class A 65 degree C temperature rise insulation, NEMA service factor, prelubricated sleeve ball bearings.

G. Enclosed Motors: Class A 65 degree C temperature rise insulation, NEMA service factor, prelubricated sleeve ball bearings.

2.5 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between one and one-half times full load torque.

B. Starting Current: Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.

D. Design, Construction, Testing, and Performance: Conform to ANSI/NEMA MG for design B motors.

E. Insulation System: NEMA Class B or better.

F. Testing Procedure: In accordance with ANSI/IEEE 12, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.

G. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

H. Thermister System (Motor Frame Sizes 254T and larger): Three PTC thermister imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.

I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for re-lubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

J. Sound Power Levels: To ANSI/NEMA MG1.

K. Nominal Efficiency: Meet or exceed values in schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112, and ASHRAE 90.1.

L. Motors, Motor Starters and Electrical Work: Mechanical Contractor shall furnish all motors, motor starters, start-stop push buttons, pilot lights, firestats, interlocking diagrams, etc. for each piece of motor driven equipment under this Contract. Mechanical Contractor shall install all motors. All motor starters, start-stop push buttons, pilot lights, etc. shall be turned over to the Electrical Contractor for installation. Electrical contractor shall be responsible for power wiring. This contractor will be responsible for control wiring.

M. Motor Starters and Push Buttons: All automatic starters shall be nominal 600 volt rating. All starters shall have two (2) auxiliary contacts.

1. Starters for single speed motors, 3/4 through 25 HP inclusive, shall be magnetically operated, "Across-the-line" 3 phase, with three overload relays, "HAND-OFF-AUTO" selector switch and pilot in cover. Starters shall be combination type with fused or circuit breaker type disconnect mechanism.
2. Starters for 30 HP and larger are to be reduced voltage, auto-transformer, combination type with fused or circuit breaker type disconnect mechanism. Starters

shall be complete with three overload relays, "HAND-OFF-AUTO" selector switch and pilot lights.

3. Enclosures for starters mounted indoors shall be NEMA 1. Enclosures for starters mounted outdoors or in wet areas shall be NEMA 3 R.
4. Remote push button stations shall be as follows: Start-stop stations shall be recess mounted with neon pilot lamp of proper voltage.
5. Push buttons for controls which are interlocked with automatic controls shall be maintained contact type. All others may be of momentary contact type.
6. Control voltage for all motor starters shall 120 volts provided by integral control voltage transformers.
7. If the Mechanical Contractor purchases equipment of larger horsepower than specified or shown on the plans, he shall pay all costs to increase the wiring and conduit.

PART 3 - EXECUTION

3.1 APPLICATION

A. Motors drawing less than 250 watts and intended for intermittent service may be germaine to equipment manufacturer and need not conform to these specifications.

B. Motors shall be open drip-proof type, except where specifically noted otherwise.

C. Single phase motors for shaft mounted fans or blowers shall be permanent split capacitor type.

3.2 NEMA OPEN MOTOR SERVICE FACTORS

HORSEPOWER	3600 RPM	1800 RPM	1200 RPM	900 RPM
1/6-1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15

3.3 MOTOR EFFICIENCY

A. Each motor furnished on the job must meet ASHRAE 90.1 and shall have a minimum guaranteed efficiency as listed in table below. Minimum guaranteed efficiencies for all motors shall be clearly stamped on motor nameplate. The lack of such stamp shall be cause for rejection of motor.

HORSEPOWER	EFFICIENCY
1, 1-1/2, 2	84.00
3	88.50

5, 7-1/2, 10	90.20
15, 20	91.70
25, 30, 40	93.00
50, 60, 75	94.10
100, 125, 150, 200	95.00

END OF SECTION 230513

SECTION 230529 - SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe and equipment hangers, supports, and associated anchors.

B. Equipment bases and supports.

C. Sleeves and seals.

D. Flashing and sealing equipment and pipe stacks.

1.2 RELATED WORK

A. Section 220700- Piping and Equipment Insulation.

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 013300.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER'S

A. Fee and Mason

B. Grinnel

2.2 PIPE HANGERS AND SUPPORTS

A. Hangers for pipe sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.

B. Hangers for pipe sizes 2 to 4 inches and cold pipe sizes 6 inches and over: Carbon steel, adjustable, clevis.

C. Multiple or trapeze hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.

D. Vertical Support: Steel riser clamp.

E. Floor support for pipe sizes 4 inches and over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roller for hot pipe 6 inches and over.

F. Shields for insulated piping 2 inches and smaller: 18 gauge galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.

G. All hangers to be sized to include insulation.

2.3 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.4 INSERTS

A. Inserts: Malleable iron case or galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms, size inserts to suit threaded hanger rods.

2.5 FLASHING

A. Metal Flashing: 26 gauge galvanized steel.

B. Lead Flashing: 5 lb./sq. ft. sheet lead for waterproofing.

C. Caps: Steel, 22 gauge minimum, 16 gauge at fire resistant elements.

2.6 SLEEVES

A. Sleeves for pipes through non-fire rated floors: Form with 18 gauge galvanized steel.

B. Sleeves for pipes through non-fire rated beams, walls, footings, and potentially wet floors: Form with steel pipe or 18 gauge galvanized steel.

2.7 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

2.8 FINISH

A. Prime coat exposed steel hangers and supports.

B. Protect against galvanic action with dielectric unions for dissimilar metals.

PART 3 - EXECUTION

3.1 INSERTS

A. Provide inserts to General Contractor for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

D. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.2 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE DIAMETER	MAX HANGER SPACING	MIN. HANGER
1-1/2 TO 2 INCH	10' - 0"	3/8"
2-1/2 TO 3 INCH	10' - 0"	1/2"
4 to 6 inch	10' - 0"	5/8"
8 to 12 inch	10' - 0"	7/8"
14 to 20 inch	15' - 0"	1"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

F. Support riser piping independently of connected horizontal piping.

3.3 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of reinforced concrete as detailed on plans.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Provide rigid anchors for pipes after vibration isolation components are installed.

3.4 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

END OF SECTION 230529

SECTION 230553 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Identification of all mechanical products installed under this Division.

1.2 RELATED WORK

A. Section 099100 - Painting: Identification painting.

1.3 REFERENCES

A. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Mechanical and plumbing contractors shall coordinate color codes and marking procedures.

1.5 APPROVAL OF PRODUCT PRIOR TO BIDDING

A. Refer to Instructions to Bidders.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.

B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.

C. Metal Tags: Brass with stamped letters, tag size minimum 1-1/2 inch (38 mm) diameter with smooth edges.

D. Stencils: With clean cut symbols and letters of following size:

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OUTSIDE DIAMETER OF INSULATION OF PIPE	LENGTH OF COLOR FIELD	SIZE OF LETTERS
3/4" - 1-1/4"	8"	1/2"
1-1/2" - 2"	8"	3/4"
2-1/2" - 6"	12"	1-1/4"
8" - 10"	24"	2 - 1/2"
Over 10"	32"	3 - 1/2"
Ductwork & Equipment	-------	2 - 1/2"

E. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing printed markings.

F. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6" wide by 4 mil thick manufactured for direct burial service.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION:

A. Degrease and clean surfaces to receive adhesive for identification material.

3.2 INSTALLATION

A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners, or adhesive.

B. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.

C. Plastic type Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.

D. Underground Plastic Pipe Markers: Install 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

E. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks and water treatment devices, and motor starters with plastic nameplates. Small devices, such as in-line pumps, may identified with plastic tags.

F. Controls: Identify control panels and major control components outside panels with plastic nameplates.

G. Valves: Identify valves in main and branch piping with tags.

H. Piping: Identify piping, concealed or exposed, with plastic pipe markers. Tags may be used on small diameter piping. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side penetration of structure or

enclosure, and at each obstruction.

3.3 PAINTING

A. All surfaces requiring painting shall be left clean by the Mechanical Subcontractor. All painting shall be done by the General Contractor's painting Subcontractor. All exposed piping or insulation, convectors, grilles, or fans, in building or on roof will be painted. Paint pipe, equipment, hangers and accessories in Equipment Rooms including covering and foundations with two (2) coats of approved paint after thoroughly cleaning. Equipment having factory finish shall be touched up and given one (1) additional coat of machinery enamel color as selected. The above shall be done by the General Contractor. See Section 09900.

B. All piping in all equipment rooms shall be identified with pipe markers with directional arrows. The following color code shall be followed.

LEGEND	PIPING	DIRECTIONAL MARKER	BAND COLOR BACKGROUND
Domestic Water	Green	Green	White

NOTE: On any asphalt finished surfaces, prime with one (1) coat of aluminum paint before final color.

END OF SECTION 230553

SECTION 230593 TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All division 23 specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to in this section.

1.2 SCOPE OF WORK

A. The Contractor shall obtain the services of an independent Test and Balance (TAB) Company which specializes in the testing and balancing of heating, ventilating and air conditioning (HVAC) systems to test, adjust and balance all HVAC systems in the building(s).

B. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. The testing, adjusting and balancing agency shall act as a reporting agency; that is, list and report each piece of equipment as to identification number, manufacturer, model number, serial number, proper location, specified performance, and report actual performance of all equipment as found during testing. The report is intended to be used during the life of the building as a ready reference indicating original conditions, equipment components, etc.

C. Representatives of the Test and Balance Company shall visit the job site during installation of the HVAC equipment, piping and ductwork as required.

D. Upon completion of the HVAC system installation, the Test and Balance Company shall perform all required testing and balancing with the full cooperation of the Contractor and his Sub-contractors. The Contractor shall make changes and/or adjustments to the HVAC system components that are required by the Test and Balance Company to accomplish proper balancing. The TAB agency shall not supply or install any materials or balancing devices such as pulleys, drives, belts, etc. All of this work is by the Contractor and shall be performed at no additional cost to the Owner.

E. The test and balance report complete with a summary page listing all deficiencies shall be submitted to the Architect for review by his Mechanical Engineer. If the Mechanical Engineer agrees with the report, he shall sign it and return it to the Architect. The test and balance report must be complete and must be accepted by the Mechanical Engineer prior to acceptance of the project. Any outstanding test and balance items shall be placed on the punch list and a monetary value shall be assigned to them.

F. After all deficiencies have been corrected the Mechanical Engineer shall sign the testing

and balancing report, and the Test and Balance Company shall supply four (4) copies of the final and complete report to the Architect for inclusion in the Operation and Maintenance Manuals.

G. The items requiring testing, adjusting, and balancing include (but are not restricted to) the following:
AIR SYSTEMS
Supply Fans
Zone, Branch, & Main Ducts
Diffusers, registers, & grilles
Coils
Exhaust Fans

1.3 DEFINITIONS, REFERENCES, STANDARDS

A. All work shall be in accordance with the latest edition of the Associated Air Balance Council (AABC) National Standards or the latest standards of the National Environmental Balancing Bureau (NEBB). If these contract documents set forth more stringent requirements than the AABC National Standards or the NEBB Standards, these contract documents shall prevail.

1.4 QUALIFICATIONS

A. Agency Qualifications: The TAB Agency shall be a current member of the AABC or the NEBB and must be in good standing with FP&C. A list of these firms shall be obtained from FP&C. Falsification of a TAB report shall be grounds for removal from the FP&C list and the firm's actions shall be reported to the appropriate certification agency. The contractor may use any FP&C approved TAB firm on a state project.

1.5 SUBMITTALS

A. Procedures and Agenda: The TAB agency shall submit the TAB procedures and agenda proposed to be used.

B. Sample Forms: The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards or the NEBB Standards.

1.6 TAB PREPARATION AND COORDINATION

A. Shop drawings, submittal data, up-to-date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided when available and no later than 30 days after the Designer has returned the final approved submittal data to the Contractor.

B. System installation and equipment startup shall be complete prior to the TAB agency's being notified to begin.

C. The building control system (BCS) contractor shall provide and install the control system, including all temperature, pressure and humidity sensors. These shall be calibrated for accurate control. If applicable, the BCS contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.

D. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.

E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

1.7 REPORTS

A. Final TAB Report - The TAB agency shall submit the final TAB report for review by the Architect. On plans provided, all outlets, devices, HVAC equipment, etc., shall be identified (including manufacturer, model number, serial number, motor manufacturer, HP, drive type, fan and motor sheaves and belt number), along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" (or similar NEBB Guaranty) assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards (or similar NEBB Standards). The Designer shall certify his approval on the Performance Guaranty.

B. Submit 4 copies of the Final TAB Report to the Architect for inclusion in the Operation and Maintenance Manuals.

PART 2 - INSTRUMENTATION

A. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards (or similar NEBB Standards).

PART 3 - EXECUTION

3.1 GENERAL

A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards (or similar NEBB Standards). Adjustment tolerances shall be + or - 10% unless otherwise stated.

B. Equipment settings, including manual damper quadrant positions, valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

C. All information necessary to complete a proper TAB project and report shall be per AABC or NEBB standards unless otherwise noted. The descriptions of work required, as listed in this section, are a guide to the minimum information needed.

D. TAB contractor shall cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Upon completion, patch insulation, ductwork and housings using materials identical to those removed. Seal insulation to reestablish integrity of the vapor barrier.

E. TAB work shall include additional inspection and adjustment of components during the season following the initial balance to include re-balance of any items influenced by seasonal changes or as directed by the Owner.

3.2 AIR SYSTEMS

A. The TAB agency shall verify that all ductwork, splitters, extractors, dampers, grilles, registers, and diffusers have been installed per design, are functional and set full open. Any leakage in the ductwork shall be repaired prior to the test. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards or NEBB Standards:

For supply fans:

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
4. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. If a traverse is not practical use the mixed-air temperature method if the inside and outside temperature difference is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.
5. Static Pressure - Test and record system static pressure, including the static pressure profile of each supply fan.

For exhaust fans:

1. Fan speeds - test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main exhaust ducts to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
4. Static Pressure - Test and record system static pressure, including the static pressure profile of each exhaust fan.

For zone, branch and main ducts:

1. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

For diffusers, registers and grilles:

1. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts. Include required CFM, initial test CFM and final CFM.
2. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

For coils:

1. Air Temperature - Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

3.3 ADDITIONAL TAB SERVICES

A. Job Site Inspections: During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems as required.

B. Verification of HVAC Controls: The TAB agency shall be assisted by the building control systems Contractor in verifying the operation and calibration of all HVAC and temperature control systems. The following tests shall be conducted:

1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water resets, fire and freeze stats, and other safety devices.
2. Verify that all controlling instruments are calibrated and set for design operating conditions.

C. Temperature Testing: To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

D. TAB Report Verification: At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.

END OF SECTION 230593

SECTION 233100 - DUCTWORK

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Low pressure duct.

B. Fire and Smoke Dampers

1.2 RELATED WORK

A. Section 230529 - Supports and Anchors

B. Section 220700 - Piping and Equipment Insulation

C. Section 233600 - Air Terminal Units

D. Section 233700 - Air Inlets and Outlets

E. Section 230593 - Testing and Balance

1.3 REFERENCES

A. ASHRAE, 1985 Fundamentals, Chapter 33.

B. ASHRAE, 1988 Equipment, Chapter 1.

C. NFPA 90A, 90B.

D. H.V.A.C. Duct Construction Standards - SMACNA 1985.

1.4 DEFINITIONS

A. Duct sizes: Inside clear dimensions for wrapped ducts, maintain sizes inside lining. Metal to metal sizes for internally lined ductwork.

B. Low Pressure: Three pressure classifications: 1/2" WG positive or negative static pressure and velocities less than 2,000 fpm, 1" WG positive or negative static pressure and velocities less than 2,500 fpm and 2" WG positive or

C. Medium Pressure: Three pressure classifications: 3 inch WG positive or negative static pressure and velocities less than 4,000 fpm, 4" WG positive static pressure and velocities greater than 2,000 fpm. 6" WG positive static pressure and velocities greater than 2,000 fpm.

1.5 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A and NFPA 90B Standards.

B. Store and protect products under provisions of Section 016000.

PART 2 - PRODUCTS

2.1 LOW PRESSURE DUCTWORK (Downstream of variable volume boxes, and hood supply exhaust, fresh air & return duct) supply ducts from units, fresh air, exhaust and return air duct.

A. Furnish and install all ducts for the air conditioning, heating and ventilating systems. Ductwork shall be complete with grilles, vanes splitters, flashings, hangers, flexible connections, manual dampers, fresh air inlet louvers, reinforcing angles, transitions to equipment, etc.

B. All low pressure ductwork (mean velocity less than 2,000 FPM and static pressure in duct 2" of water or less) shall be constructed as per ASHRAE, 1968 Edition, Chapter 1, and shall be of the gauge metal and reinforced as per Table 4 therein.

C. Flashing shall be of the same material as specified under the roofing and flashing section of these specifications, or of 16-ounce sheet copper and shall be furnished and installed around all outside openings used for ducts or fans where required. Roof flashing shall extend at least 8" above roof. Cooperate with roofing contractor when installing flashing.

D. All duct connections to equipment shall be made with fire and mildew resistant flexible connections of canvas or other acceptable materials. Connections shall have suitable metal collar frames at each end and shall not be less than 4" long with at least 1" of slack in the connection. Flexible connections shall be heat resistant to 500 degrees F continuously.

E. Duct dimensions shown are metal sizes. All edges shall be straight and true.

F. All flexible connections, duct liner and adhesives shall be U.L. listed as having a maximum flame spread of 50, fuel contribution of 25 and smoke contribution of 25.

G. This Contractor shall furnish and install in ductwork all dampers, vanes splitters, etc.. as shown on the drawings or necessary to make the system complete. Where dampers or splitters can not be accessed through lay in ceiling, Contractor shall provide lockable 24” x 24” access door. Contractor shall coordinate location with Architect.

H. Shafts shall be marked to show position of dampers, vanes, splitters, etc.

I. Ductwork shall be supported in accordance with SMACNA Plate No. 17 and No. 18, up to and including band iron hangers attached to duct by means of screws or rivets per hanger.

J. Access doors shall be provided in ductwork for all automatic dampers and each manual damper 3 square feet in area or larger, and shall be so located that damper can be

completely serviced through the access door. Access door shall be provided with felt gaskets and suitable hinges and locks. Where access doors occur in insulated duct, double skin insulated doors shall be used.

K. Where square ducts are shown, provide single vane elbows as per Plate 22, Figure A, SMACNA Standards, 1985 Edition. For all ductwork over 18" provide double vane square elbow as shown in Figure C of the Plate.

L. All low pressure ductwork joints shall be sealed with hard cast "iron grip".

M. Flexible air duct for connections between low pressure rectangular duct and ceiling diffusers shall be pre- insulated and listed by Underwriters Laboratories under U.L Standard 181 as a Class 1 flexible air duct and complying with NFPA Standards 90A and 90B.

N. All flex duct 45 degree and 90 degree turns shall be metal hard duct.

2.2 INSULATED ACOUSTICAL LOW PRESSURE FLEXIBLE DUCT

A. The duct shall be constructed of a CPE fabric supported by helical wound galvanized steel.

B. Provide where indicated on drawings Flexmaster Type 8M UL181 Class I Air Duct.

C. Fabric shall be mechanically locked to the steel helix without the use of adhesives or chemicals.

D. The internal working pressure rating shall be at least 6" w.g. positive and 4" w.g. negative with a bursting pressure of at least 2½ time the working pressure.

E. The duct shall be rated for a velocity of at least 4000 feet per minute.

F. The duct must be suitable for continuous operation at a temperature range of -20° F to +250°

G. Acoustical performance, when tested by an independent laboratory in accordance with the Air Diffusion Council's Flexible Air Duct Test Code FD 72-R1, Section 3.0, Sound Properties, shall be as follows:

The insertion loss (dB) of a 10 foot length of straight duct when tested in accordance with ASTM 477, at a velocity of 2500 feet per minute, shall be at least:

Octave Band	2	3	4	5	6	7
Hz.	125	250	500	1000	2000	4000
6" diameter	7	31	40	38	40	27
8" diameter	13	29	36	35	38	22

12" diameter	21	28	29	33	26	12

The radiated noise reduction (dB) of a 10 foot length of straight duct when tested in accordance with ASTM E477, at a velocity of 2500 feet per minute, shall be at least:

Octave Band	2	3	4	5	6	7
Hz.	125	250	500	1000	2000	4000
6" diameter	5	8	7	8	11	15
8" diameter	10	7	7	8	10	13
12" diameter	9	6	6	5	9	13

The self generated sound power levels (LW) dB re 10^{-12} Watt of a 10 foot length of straight duct for an empty sheet metal duct when tested in accordance with ASTM E477, at a velocity of 1000 feet per minute, shall not exceed:

Octave Band	2	3	4	5	6	7
Hz.	125	250	500	1000	2000	4000
6" diameter	42	31	23	18	17	21
8" diameter	41	34	27	19	18	21
12" diameter	54	45	38	31	27	23

Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 5.0 at a mean temperature of 75° F. (R-4.2 is not acceptable)

H. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

I. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

J. Maximum length to be 6’-0
ALL FLEX CONNECTIONS TO CEILING DIFFUSERS MUST BE FACTORY DESIGNED TO HAVE NO DIMENSIONAL CONTORTION WHEN CONNECTED TO THE DIFFUSER. A HARD METAL 90-DEGREE ELBOW OR A PLASTIC “CRUTCH” ELBOW IS REQUIRED FOR OTHER FLEX DUCTS THAT MAY BE SUPPLIED

2.3 FIRE AND SMOKE DAMPERS

A. Round and oval fire dampers shall be designed for high pressure duct systems.

B. Rectangular fire dampers shall be designed for low pressure duct systems.

C. All fire dampers must be NFPA 90A and UL approved.

D. Furnish and install access doors in ductwork, walls, and ceilings where required to service all fire dampers, smoke dampers and detectors. All fire and smoke dampers shall be installed by the sheet metal contractor. All smoke detectors shall be furnished by the electrical Sub-contractor. Control of smoke dampers shall be coordinated with fire alarm system and building automation system.

E. Rectangular Smoke Dampers - Louvers Dampers Inc. Model SD-400-UD or Ruskin FSD-35 tight seal parallel blade smoke dampers with low leakage and felted blades.

F. Round and Oval Smoke Dampers - Shall be same as above but complete with welded round or oval collars. Units shall be capable of handling pressures up to 6" W.G.

G. Smoke dampers shall be Class I rated as per UL 555.

H. Sheet metal contractor shall provide and install all smoke dampers and actuators. Dampers shall be provided with end switches

2.4 SPIN TAPS

A. All round low pressure connections to rectangular ducts shall be made with a factory fabricated spin collar fitting with damper and constructed of minimum 26 ga galvanized steel. The damper shall have a 2” raised handle with a high quality locking quadrant. A 3/8” continuous rod with “U” bolts connects the damper to the rod. Nylon end bearings are required where the rod penetrates the spin collar barrel.

B. Provide Flexmaster #FLD-B03, Dace #26 ga MSDS – CO3 , or prior approved equal.

2.5 LOW LOSS TAP

A. All round low pressure connections to rectangular ducts shall be made with a factory fabricated 45 degree low loss entry “shoe” tap with damper constructed of minimum 26 gage galvanized steel. The damper shall have a 2” raised handle with a high quality locking quadrant. A 3/8” continuous rod with “U” bolts connects the damper to the rod. Nylon end bearings are required where the rod penetrates the spin collar barrel.

B. Provide Flexmaster #STOD-BO3, Dace # 26 ga STOD-C03, or prior approved equal.

C. For medium pressure systems where used upstream of VAV terminals, the damper can be eliminated (use Flexmaster #STO or Dace 24 ga STO). Gauge shall be 24 gauge on medium pressure systems.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See details of ductwork symbols and connections on drawing.

END OF SECTION 233100

SECTION 233410 - GENERAL EXHAUST SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. This Section includes general and exhaust fans with accessories.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Requirements of the following Division 23 Sections apply to this section:

1. "BASIC MECHANICAL REQUIREMENTS."
2. "BASIC MATERIALS AND METHODS."
3. "ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT."

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 013300.

B. Product data for selected models, including specialties, accessories, and the following:

1. Fan performance curves with system operating conditions indicated.
2. Fan sound power ratings.
3. Motor ratings and electrical characteristics plus motor and fan accessories.
4. Materials gages and finishes.
5. Dampers, including housings, linkages, and operators.

C. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.

D. Maintenance data for inclusion in Operating and Maintenance Manual.

1.4 QUALITY ASSURANCE

A. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character, and quality or product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid approval requirements of Instruction to Bidders.

B. Where no manufacturer or model number are given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Exhaust Fans:

a. Greenheck GB Series
b. Cook

2.3 SOURCE QUALITY CONTROL

A. Testing Requirements: The following factory tests are required:

1. Sound Power Level Ratings for General Exhaust Fans: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code For Sound Rating." General exhaust fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency shall be factory tested and ratings in accordance with AMCA Standard 210/ASHRAE STANDARD.

2.4 DIRECT AND BELTED SPUN ALUMINUM POWER ROOF VENTILATORS

A. General Description:

1. Direct Drive: Roof exhaust fans shall be centrifugal direct drive type.
2. The fan wheel shall be centrifugal backward incline, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
3. The fan housing and schroud shall be constructed of heavy gauge aluminum with a ridged internal support structure. The fan shroud shall have a rolled bead for added strength.

4. Motors shall be out of the air stream on vibration isolators. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance.
5. A disconnect switch shall be factory installed and wired from the fan motor to a junction box within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring.

B. General Description: Belt Drive

1. Belt Drive Centrifugal Roof Exhausters shall have centrifugal forwardly inclined wheels, constructed of aluminum and shall include a wheel cone carefully matched to the inner cone for precise tower running. Wheels shall be statistically and dynamically balanced.
2. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. The fan schroud shall have a rolled beam for added strength.
3. Motors shall be heavy duty ball bearing type carefully matched to the fan mode and furnished at the specified voltage, phase and enclosure. Motors and drive shall be mounted on vibration isolators, out of the air stream. Fresh air for motor shall be drawn in the motor compartment from an area free of discharge contaminants. Motors shall be accessibly for maintenance.
4. Drive frame assembly shall be constructed of heavy gauge steal and mounted on vibration isolators
5. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in access of 200,000 hours at maximum catalog operating speed.
6. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully matched cast iron type, keyed and securely attached to the wheel and motor shaft. Motor pulleys shall be adjustable for final system balance.
7. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment. A fan conduit chase shall be provided through the curb cap to the motor compartment for ease of installation.
8. All fans shall bear AMCA Certified Ratings Seal for sound and air performance.
9. Each fan shall bear a permanently affixed manufacturer's name plate containing the model number and individual serial number for future identification.

END OF SECTION 233410

SECTION 233700 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Diffuser boots.

B. Registers/grilles.

C. Louvers.

1.2 RELATED WORK

A. See Mechanical Plans for wall louvers.

1.3 REFERENCES

A. ADC 1062 - Certification, Rating and Test Manual.

B. AMCA 500 - Test Method for Louvers, Dampers, and Shutters.

C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

D. ARI 650 - Air Outlets and Inlets.

E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

F. SMACNA - Low Pressure Duct Construction Standard.

1.4 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate performance of louvers in accordance with AMCA 500.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 013300.

B. Provide product data for items required for this project.

C. Submit schedule of outlets and inlets indicating type, size, application, and noise level.

D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.

E. Submit diffuser, grille and register color data to Architect for approval.

PART 2 - PRODUCTS

2.1 GENERAL

A. See mechanical schedules and drawings for diffuser types, sizes and configuration. See architectural plans - room finish schedules for type of ceiling and wall construction.

B. Substitutions: Under provisions of Instructions To Bidders.

2.2 ACCEPTABLE MANUFACTURERS - Ceiling Diffusers

A. Titus TMSA Series, Krueger Series 1400 Adjustable

B. All diffusers shall have opposed blade volume dampers and adjustable horizontal to vertical four way throw operable from face of grille.

2.3 ACCEPTABLE MANUFACTURERS - Ceiling Exhaust Grilles

A. Titus - Model 50F Code C 1/2" x 1/2" x 1" Cube Core, Krueger EGC-10

B. All exhaust registers shall have opposed blade dampers.

C. Grilles shall have baked enamel white finish.

D. All dampers shall be operable from grille face.

2.4 ACCEPTABLE MANUFACTURERS - Ceiling Return Air Grilles

A. Titus - 50F Code C, Krueger EGC-10

B. All return air shall have opposed blade dampers. See plans for filter backed grille requirements.

2.5 ACCEPTABLE MANUFACTURERS - Wall Supply Registers.

A. Titus 1700 Series, Krueger ULTRA-FLO

B. All registers shall have adjustable blade dampers on all registers.

C. Furnish and install opposed blade damper on all registers.

D. Finish to be approved by Architect.

2.6 ACCEPTABLE MANUFACTURERS - DOOR RETURN GRILLES

A. Titus Model CT-700, Krueger Series 5600

B. Substitutions: Under provisions of Instructions To Bidders.

C. All aluminum construction & design.

D. Finish to be approved by Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement. Refer to Section 017300.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and register, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Furnish and install necessary frames, bucks, sponge rubber gasketed, etc. to make a neat setting job.

F. Diffusers shall be placed to insure that air does not blast against columns and lights.

G. All diffusers, registers, etc. shall have external volume controls and deflecting grids.

H. Ceilings in areas where plaster or gypsum board ceiling are used, shall be surface mounted.

END OF SECTION 233700

SECTION 235410 - FORCED AIR FURNACE ELECTRIC HEAT – DX

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Forced Air Furnace

B. Refrigeration Cooling Coil

C. Controls

D. Electric Heater

1.2 RELATED WORK

A. Section 230000: General Mechanical

B. Section 230529: Supports and Anchors

C. Section 220700: Piping Insulation

D. Section 233100: Ductwork

1.3 QUALITY ASSURANCE

A. Conform to requirements of UL and applicable codes.

B. Cooling system tested and rated to ARI Standard 210.

1.4 SUBMITTALS

A. Submit manufacturer's installation instructions.

B. Submit manufacturer's descriptive literature, operating instruction, and maintenance and repair data.

PART 2 – PRODUCTS

2.1 TYPE

A. Provide horizontal type with electric heating elements.

B. Provide self contained packaged, factory assembled, pre-wired units, consisting of cabinets, supply fan, controls, air filter, refrigerant cooling coil.

2.2 PERFORMANCE

A. Refer to Schedule of Drawings for performance and capacities.

2.3 CONSTRUCTION

A. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation.

B. Fan: Direct or belt drive (as scheduled), rubber isolated mounted 1750 rpm motor.

C. Air Filters: One (1) inch thick glass fiber, disposable type arranged for easy replacement.

2.4 ELECTRIC HEATER

A. Finned tube metal sheath heating elements or open coil type (black heat) arranged in incremental stages as scheduled, accessible, with protection against no or low air flows, shorts or grounds, and failure of protection devices.

2.5 ELECTRIC HEATER CONTROLS

A. Unit to be complete with low voltage transformer, terminal box with built-in factory wired magnetic contactors and high temperature thermal cutout protection with magnetic contactors rated for 100,000 cycle service: electric heating coils to be protected as per Article 424 of National Electric Code, UL approved and so labeled.

2.6 EVAPORATOR COIL

A. Mount in furnace supply plenum, copper tube with mechanically bonded aluminum fins in a coil assembly, with galvanized drain pan, drain connection, and refrigerant piping connections.

B. Provide factory installed thermostatic expansion valve.

2.7 CONTROLS

A. temperature control sequence of air conditioning equipment: "automatic controls are placed into operation when system is energized. Provide room type thermostat to cycle condensing unit on the cooling cycle and the electric heater strip on the heating cycle as required to maintain space conditions. Air handling unit fan shall be wired for constant fan operation and shall be electrically interlocked such that the condensing

unit may not run nor the electric heater strip be energized unless the evaporator fan is running. An air switch shall be installed which shall prevent electric heater operation until air flow is proven. if return air temperature rises above firestat setpoint then the firestat (located in the return air plenum) shall de-energize the air handling unit fan(s). If supply air contains smoke, a smoke detector (located in the supply air plenum) shall de-energize the air handling unit fan(s). If auxiliary drain pan fills with water, a float switch shall de-energize the condensing unit."

B. Contractor shall provide clear locking cover for all thermostats.

2.8 ACCEPTABLE MANUFACTURERS

A. Trane Company

B. York International

C. Lennox Industries

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install in strict accordance with manufacturer's recommendations.

B. Pipe condensate drain as shown on the drawings or to the nearest available plumbing vent.

END OF SECTION 235410

SECTION 236313 - AIR COOLED CONDENSING UNIT

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Condensing Unit Package

B. Internal Piping and Accessories

C. Controls

1.2 RELATED WORK

A. Section 230000: General Mechanical

B. Section 230529: Supports and Anchors

C. Section 230513: Motors

D. Section 230553: Mechanical Identification

E. Section 235410: Forced Air Furnace - Electric - DX

1.3 QUALITY ASSURANCE

A. Conform to requirements of UL and applicable codes.

B. Test and rate cooling system to ARI Standard 210.

1.4 SUBMITTALS

A. Submit shop drawings and product data.

B. Submit with shop drawings, schematic layouts showing condensing units, cooling coils, refrigerant piping, size, and accessories required for complete system.

C. Submit manufacturer's installation instructions.

PART 2 – PRODUCTS

2.1 TYPE AND PERFORMANCE

A. Provide self-contained, package, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressor(s), condensing coil(s) and fan(s), integral sub-cooling coil, controls, liquid receiver, and screen(s).

B. Refer to Schedule on Drawings for air cooled condensing unit(s) requirements.

C. Acceptable Manufacturer: Trane Company; York International; Lennox Industries

2.2 MATERIALS

A. Use corrosion resistant materials for parts in contact with refrigerant. Provide timer circuits to prevent rapid loading and unloading of compressor.

2.3 CABINET

A. Galvanized steel with baked enamel finish, and removable access doors or panels with quick fasteners.

2.4 COMPRESSOR(S)

A. Provide hermetically sealed, 1750 rpm resiliently mounted compressor with positive lubrication, crankcase heater, cylinder unloaders for capacity modulation (as scheduled), motor overload protection, service valves, filter driers (suction and liquid), and site glass.

2.5 CONDENSER

A. Coil: Seamless copper tube with mechanically bonded aluminum fins.

B. Fans: Vertical discharge, direct or belt drive axial fan(s), resiliently mounted with guard and motor.

C. Motors: Permanently lubricated ball bearing motors with built-in current and overload protection.

2.6 CONTROLS

A. Provide high and low pressure cutouts for compressor, oil pressure control, and reset relay.

B. Provide controls to permit operation down to 50-degrees F. ambient temperature at minimum compressor load.

2.7 REFRIGERANT PIPING

A. Refrigerant piping shall be run in Type "L" hard drawn copper tubing attached with wrought copper fittings, utilizing 1000-degree silver solder and a non-corrosive flux. Refrigerant piping shall be sized and installed in strict accordance with the air conditioning unit manufacturer's recommendations and directions and shall be submitted to the Engineer for prior approval before installation. Pressure drops shall not exceed the equivalent of 2-psi. Refrigerant piping system shall be evacuated, charged with refrigerant holding charge. The refrigerant lines to be tested with nitrogen to a test pressure of not less than 450 psi and proved before final charge of refrigerant. Compressor shall not be subject to the 450 psi pressure test.

B. All refrigerant piping shall comply with the applicable requirements of the safety Code of Mechanical Refrigeration (ASA-89.1-1956) and the Code of Refrigerant Piping (ASA-831.5-1962), and all state ordinances, codes, and regulations.

C. Refrigerant suction line shall be insulated with cellular foam type insulation; "K" value of 0.28 at 75-degrees F. Manufacturers: Armstrong "Armaflex" or Rubatex R-180-FS.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Complete structural, mechanical and electrical connections in accordance with manufacturer's installation instructions.

B. Mount unit on 4" concrete pad with minimum 6" clearance all around or as indicated on the drawings.

C. Furnish charge of refrigerant and oil.

3.2 START-UP AND TESTING

A. Dehydrate, charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

3.3 GUARANTEE

A. Reciprocating refrigerant compressor shall have full five (5) year warranty.

END OF SECTION 236313

DIVISION 26 – ELECTRICAL

SECTION 260500 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following electrical materials and methods:

1. Building wire, connectors, and splices for branch circuits and feeders.
2. Supporting devices for electrical components.
3. Concrete equipment bases.
4. Electrical identification.
5. Cutting and patching for electrical construction.
6. Touchup painting.

B. Where a “Standard Specification” (i.e., ANSI, UL, etc.) is referenced and no manufacturer’s are listed, the Contractor shall submit for Prior Approval in adherence with the specified Standard, and in accordance with the submittal requirements identified.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate electrical equipment installation with other building components.

B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for electrical installations.

C. Coordinate installing required supporting devices and set sleeves in poured-in-place

concrete and other structural components as they are constructed.

D. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning prior to closing in the building.

E. Coordinate connecting electrical service to components furnished under other Sections.

F. Coordinate connecting electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

G. Coordinate installing electrical identification after completion of finishing where identification is applied to field-finished surfaces.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Description: Single conductor, copper. Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

B. Cross-Linked Polyethylene Insulated Wire: Conform to NEMA WC7. Provide factory-fabricated wire of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Select from the following UL types, those wires with construction features which fulfill project requirements:

1. Type THWN:For dry and wet locations; max operating temperature 75 deg C (167 deg F). Insulation, flame-retardant, moisture- and heat-resistant, thermoplastic; outer covering, nylon jacket; conductor, annealed copper.
2. Type THHN:For dry and damp locations; max operating temperature 90 deg C (194 deg F). Insulation, heat-resistant thermoplastic flame-retardant, nylon jacket; conductor, annealed copper.

C. Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated. Select to comply with Project's installation requirements.

2.2 SUPPORTING DEVICES

A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.

1. Material: Steel, except as otherwise indicated, protected from corrosion with zinc coating or with treatment of equivalent corrosion resistance using approved alternative finish or inherent material characteristics.
2. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel,

except as otherwise indicated. Provide NEMA 3R Housing for devices installed outdoors.

B. Steel channel supports have 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

1. Fittings and accessories mate and match with channels and are from the same manufacturer.

C. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps or "click"- type hangers.

D. Sheet-Metal Sleeves: 0.0276-inch or heavier galvanized sheet steel, round tube, closed with welded longitudinal joint.

E. Expansion Anchors: Carbon-steel wedge or sleeve type.

F. Toggle Bolts: All-steel springhead type.

G. Powder-Driven Threaded Studs: Heat-treated steel.

2.3 CONCRETE EQUIPMENT BASES

A. Concrete: 3000-psi, 28-day compressive strength.

2.4 ELECTRICAL IDENTIFICATION

A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch wide.

C. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

D. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched for mechanical fasteners 1/16-inch minimum thick for signs up to 20 sq. in., 1/8 inch thick for larger sizes. Engraved legend in black letters on white face. Provide engraved laminate plate with white letters on a red face for emergency power panels.

E. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.5 TOUCHUP PAINT

A. For Equipment: Provided by equipment manufacturer and selected to match equipment finish.

B. For Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

A. Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.

B. Install items level, plumb, and parallel and perpendicular to other building systems and components, except where otherwise indicated.

C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Give right of way to raceways and piping systems installed at a required slope.

3.2 WIRING METHODS

A. Feeders: Type THHN/THWN/XHHW, copper conductor in raceway.

B. Underground Feeders: Type THHN/THWN/XHHW, copper conductor, in raceway.

C. Branch Circuits: Type THHN/THWN/XHHW, in raceway.

3.3 ELECTRICAL SUPPORTING METHODS

A. Damp Locations and Outdoors: Hot-dip galvanized materials, U-channel system components.

B. Dry Locations: Steel materials.

C. Conform to manufacturer's recommendations for selecting supports.

D. Strength of Supports: Adequate to carry all present and future loads, times a safety factor of at least 4; 200-lb minimum design load.

3.4 INSTALLATION

A. Install wires in raceway according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Conductor Splices: Keep to the minimum and comply with the following:

1. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
2. Use splice and tap connectors that are compatible with conductor material.

3. Splices shall be installed with adequate access for Testing and Maintenance.

C. Wiring at Outlets: Install with at least 12 inches of slack conductor at each outlet.

D. Connect outlets and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

E. Install devices to securely and permanently fasten and support electrical components.

F. Raceway Supports: Comply with NFPA 70 and the following requirements:

1. Conform to manufacturer's recommendations for selecting and installing supports.
2. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
3. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
4. Spare Capacity: Size supports for multiple conduits so capacity can be increased by a 25 percent minimum in the future.
5. Support individual horizontal raceways with separate, malleable iron pipe hangers or clamps.
6. Hanger Rods: 1/4-inch diameter or larger threaded steel, except as otherwise indicated.
7. Spring Steel Fasteners: Specifically designed for supporting single conduits or tubing. May be used in lieu of malleable iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to channel and slotted angle supports.

G. Miscellaneous Supports: Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices except where components are mounted directly to structural features of adequate strength.

H. Sleeves: Install for cable and raceway penetrations of concrete slabs and walls, except where core-drilled holes are used. Install for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies.

I. Firestopping: Apply to cable and raceway penetrations of fire-rated floor and wall assemblies. Perform firestopping to reestablish the original fire-resistance rating of the assembly at the penetration.

J. Fastening: Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure. Perform fastening according to the following:

1. Fasten by means of toggle bolts on hollow masonry units; concrete inserts or expansion bolts on concrete or solid masonry; and by machine screws, welded threaded studs, or spring-tension clamps on steel.
2. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts, machine screws, or wood screws.
3. In partitions of light steel construction use sheet-metal screws.
4. Drill holes in concrete so holes more than 3/4 inch deep do not cut main reinforcing bars.
5. Fill and seal holes drilled in concrete and not used.
6. Select fasteners so the load applied to any fastener does not exceed 25 percent of the proof-test load.

K. Install identification devices where required.

1. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
2. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated on the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.
3. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.
4. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

3.5 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for electrical installations. Perform cutting by skilled mechanics of the trades involved.

B. Repair disturbed surfaces to match adjacent undisturbed surfaces.

END OF SECTION 260500

SECTION 260533 - RACEWAYS, BOXES, AND CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Raceways include the following:

1. Rigid metal conduit.
2. Electrical metallic tubing (EMT).
3. Flexible metal conduit.
4. Liquidtight flexible conduit.
5. Rigid nonmetallic conduit.
6. Wireway.

C. Boxes, enclosures, and cabinets include the following:

1. Device boxes.
2. Floor boxes.
3. Outlet boxes.
4. Pull and junction boxes.
5. Cabinets and hinged cover enclosures.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed and Labeled": As defined in the "National Electrical Code", Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Comply with NECA "Standard of Installation."

D. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Electrical Metallic Tubing and Fittings: ANSI C80.3 with compression-type fittings.

C. Flexible Metal Conduit: Zinc-coated steel.

D. Liquidtight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.

E. Fittings: NEMA FB 1, compatible with conduit/tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Rigid Nonmetallic Conduit (RNC): Schedule 40 or 80 PVC.

B. PVC Conduit and Tubing Fittings: match to conduit or conduit/tubing type and material.

2.3 WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.

C. Wireway Covers: Hinged type.

D. Finish: Manufacturer's standard enamel finish.

2.4 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast Metal Boxes: NEMA FB 1, type FD, cast feralloy box with gasketed cover.

2.5 FLOOR BOXES

A. Floor Box: Cast metal, fully adjustable, rectangular.

2.6 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid metal conduit.
2. Underground, Single Run: Rigid nonmetallic conduit.
3. Underground, Grouped: Rigid nonmetallic conduit.
4. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit.
5. Boxes and Enclosures: NEMA Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): liquidtight flexible metal conduit.
2. Damp or Wet Locations: Rigid steel conduit.
3. Exposed: Electrical metallic tubing.
4. Concealed: Electrical metallic tubing.
5. Boxes and Enclosures: NEMA Type 1, except in damp or wet locations use NEMA Type 3R.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

C. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

D. Install raceways level and square and at proper elevations. Provide adequate headroom.

E. Complete raceway installation before starting conductor installation.

F. Support raceway as specified in Division 16 Section "Supporting Devices."

G. Use temporary closures to prevent foreign matter from entering raceway.

H. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

I. Make bends and offsets so the inside diameter is not reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

J. Use raceway fittings compatible with raceway and suitable for use and location.

K. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, except as otherwise indicated.

L. Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1 inch (25 mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in the concrete.
3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. When at right angles to reinforcement, place conduit close to slab support.
4. Transition nonmetallic tubing to rigid steel conduit, or IMC before rising above floor.

M. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.
2. Make bends in parallel or banked runs from same center line to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

N. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

O. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely, and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

P. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

Q. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

R. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Install separate ground conductor across flexible connections.

S. Set floor boxes level and adjust to floor surface.

T. Install hinged cover enclosures and cabinets plumb. Support at each corner.

U. Provide grounding connections for raceway, boxes, and components as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touch-up coating recommended by the manufacturer.

3.5 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 260533

SECTION 261000 – DATA NETWORK DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 GENERAL SPECIFICATIONS

A. This document establishes the general specifications for a “universal” premises distribution system that will support industry standard data communications.

1.2 GENERAL CHARACTERISTICS OF CABLE DESIGN

A. This document describes requirements for a cabling system in compliance with EIA/TIA 568B.1 standards. All components that are proposed must be certified to be compliant with these standards. The horizontal cabling system will be Category 6 for data, plenum rated, thermo-plastic, copper cable and associated connectors.

1.3 WARRANTY

A. The complete data network distribution system installed under this project shall be warranted for three years by the installing contractor.

PART 2 - DISTRIBUTION SYSTEM REQUIREMENTS

2.1 INTRODUCTION

A. This scope of work includes the provisioning, installation and testing of cable, wire, and miscellaneous hardware according to the applicable design rules of associated standards.

B. Media Types
   1. The media used for transmission to workstation outlets is as follows:
      (a) Category 6 unshielded twisted 4 pair copper wire (24 AWG) FEP insulated, plenum rated data cable terminated on both ends.
      (b) Any cables installed in underground raceways shall be specifically listed for installation in wet locations and shall be jelly filled.

2.2 Equipment Rooms/Satellite Closets

A. Cross-Connect Specifications
   1. The cross-connect hardware must offer design flexibility to allow the system to expand. Unless otherwise specified, bids should be based on the use of Category 6 patch panels with RJ45 jacks and wires terminated in accordance with the ½-inch rule of EIA 568B. All cables will be terminated in Category 6 patch panels fully equipped with horizontal and vertical wire management. Wire management is required between each patch panel.

B. Cross-Connect Administration
   1. The distribution system must allow for administration of the communication system via the cross-connect and patch panel configuration, there by providing easy station and terminal rearrangements. Document each wire pull and cross

connect along with test data in written and electronic formats prior to acceptance of the cabling system.

C. Cross-Connect Specifications
1. The termination hardware will be located on a 19”x38” rack in the Electrical Equipment Room. The configuration of the patch panel should be in an arrangement that minimizes patch cord lengths. Provide one (1) meter patch cord for each wired patch panel port.

2.3 ELECTRICAL REQUIREMENTS

A. All wiring that is exposed to potential electrical hazardous voltages and currents must be protected with the appropriate heat coils and sneak fuses as prescribed in the appropriate electrical code for Louisiana and /or National Electrical code (NEC) Article 250 and Article 800.

2.4 HORIZONTAL SUBSYSTEM

A. Information Outlets:
1. Information Outlet Definition
(a) The information outlet (jack) is defined as Category 6, 8- pin modular jack or connecting block, terminating 4 pair of 24 AWG unshielded, twisted copper wire, which must meet the requirements described EIA/TIA 568-B.1-2000, Category 6. The jack shall be designed with an integral locking mechanism, which, upon insertion of a modular plug, provides maximum pullout strength. The outlets proposed must have the ability to be color-coded by use of a Bizel or the outlet itself being color-coded.

B. The 4-pair wire runs from each work location to the nearest satellite closet shall utilize provided stub up conduits. Be supported by J hooks every 4 feet if not in conduit.

C. Horizontal wiring requirements:
1. From each jack location there shall be two sheaths of category 6 (4-pair, plenum) inside wiring cable to the patch panel.

2.5 CABLE PROTECTION

A. Unless otherwise specified, all cable requiring electrical protection shall be installed with gas tube or solid state protection devices at both ends as prescribed by the appropriate regulations or electrical code for the service areas.

PART 3 - EXECUTION

3.1 TEST/ACCEPTANCE CRITERIA

A. Testing
1. Test each installed coppercable in accordance with TSB 67 to include basic link test and all level two tests. Submit hard copy report of test results.
2. Test each fiber strand in one direction at 850 NM or 1300 NM.
3. Replace any cable which does not pass the acceptance test and re-test.

B. Labeling

1. Label each end of each cable with machine printed self adhesive labels.

END OF SECTION 261000

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V or less.

1.3 DEFINITIONS

A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditoins of Contract and Divison 1 Specification Sections.

B. Product data for each type panelboard, accessory item, and component specified.

C. Shop drawings from manufacturers of panelboards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:

1. Enclosure type with details for types other than NEMA Type 1.
2. Bus configuration and current ratings.
3. Short-circuit current rating of panelboard.
4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The terms “listed” and “labeled” shall be defined as they are in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” (NRTL) as defined in OSHA Regulation 1910.7.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, “National Electrical Code.”

C. NEMA Standard: Comply with NEMA PB1, “Panelboards.”

D. UL Standards: Comply with UL 61, “Panelboards,” and UL 50, “Cabinets and Boxes.”

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Refer to the performance specifications outlined in this section to provide products by the following:

1. Siemens Energy & Automation, Inc.
2. Square D Co.
3. General Electric, Inc.
4. Cutler Hammer, Inc.

2.2 PANELBOARDS, GENERAL REQUIREMENTS

A. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Tandem circuit breakers shall not be used. Multipole breakers shall have common trip. Provide AIC ratings as shown on drawings.

B. Enclosures: Cabinets, door in door fronts, flush or surface mounted as indicated. NEMA Type 1 enclosure, except where the following enclosure requirements are indicated.

1. NEMA 3R: Raintight.

C. Front: Door in door construction. Front for surface-mounted panels shall be same dimensions as box. Fronts for flush panels shall overlap box except as otherwise specified.

D. Directory Frame: Metal, mounted inside each panel door.

E. Bus: Hard drawn copper of 98 percent conductivity.

F. Main and Neutral Lugs: Compression type. Bus shall be sized to meet the minimum A/C rating as indicated.

G. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box.

H. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.

I. Feed-Through Lugs: Sized to accommodate feeders and AIC ratings as idicated.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

A. Branch OCPDs: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Double-Width Panels: Where more than 42 poles are indicated or where otherwise indicated, provide two panelboards of equal height and ampacity ratings.

C. Doors: Door-in-Door construction. In panel front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike.

D. Provide AIC ratings for panels as specified on drawings.

2.4 DISTRIBUTION PANELBOARDS

A. Doors: In panel front secure with tumbler lock, all keyed alike.

B. Branch-Circuit Breakers: Where OCPDs are indicated to be circuit breakers, use bolt-on breakers except circuit breakers 225-ampere frame size and greater may be plug-in type where individual prositive locking device requires mechanical release for removal.

C. Provide AIC ratings for panels as specified on drawings.

2.5 IDENTIFICATION

A. General: Refer to Division 26 Section “Electrical Identification” for labeling materials.

B. Panelboard Nameplates: Engraved laminated plastic or metal nameplate for each panelboard mounted wqith stainless screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, “General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less and manufacturers’ written installation instructions.

B. Mounting Heights: Top of trim 74 inches above finished floor, except as indicated.

C. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish.

D. Circuit Directory: Typed as reflective of final circuit changes required to balance panel loads. Obtain approval before installing.

E. Install filler plates in unused spaces.

F. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panel into accessible ceiling space or space designated to be ceiling space in future. Stub four1-inch empty conduits into raised floor space or below slab other than slabs on grade.

G. Auxiliary Gutter: Install where a panel is tapped to a riser at an intermediate location.

H. Wiring in Panel Gutters: Train conductors neatly in groups, budle, and wrap wth wire ties after completion of load balancing.

3.2 IDENTIFICATION

A. Identify field-installed wiring and components and provide warning signs in accordance with Division 26 Section “Electrical Identification.”

3.3 GROUNDING

A. Connections: Make equipment grounding connections for panelboards as indicated.

B. Provide ground continuity to main electrical ground bus indicated.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer’s published torque-tightening values. Where manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Visual and Mechanical Inspection: Include the following inspections and related work:

1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
2. Exercise and perform of operational tests of all mechanical components and other operable devices in acco4rdance with manufacturer’s instruction manual.
3. Check panelboard mounting, area clearances, and alignment and fit of components.
4. Check tightness of bolted electrical connecitons with calibrated torque wrench. Refer to manufacturer’s instructions for proper torque values.

5. Perform visual and mechanical inspection and related work for overcurrent protective devices as specified in Division 16 Section “Overcurrent Protective Devices.”

3.6 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.7 COMMISSIONING

A. Balancing Loads: After Substantial Completion, but not more than two months after Final Acceptance, conduct load-balancing measurements and circuit changes as follows:

1. Perform measurements during period of normal working load as advised by the Owner.
2. Perform load-balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical 24-hour services such as FAX machines and on-line data processing computing, transmitting, and receiving equipment.
3. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference between phase loads exceeding 20 percent at any one panelboard is not acceptable. Rebalance and recheck as required to meet this minimum requirement.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes various types of receptacles, connectors, switches, and finish plates.

B. Where a “Standard Specification” (i.e., ANSI, UL, etc.) is referenced and no manufacturer’s are listed, the Contractor shall submit for Prior Approval in adherence with the specified Standard, and in accordance with Section 260050.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product specified.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for devices and installation.

B. Listing and Labeling: Provide products that are listed and labeled for their applications and installation conditions and for the environments in which installed.

1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 COORDINATION

A. Wiring Devices for Owner Furnished Equipment: Match devices to plug connectors for Owner-furnished equipment.

B. Cord and Plug Sets: Match cord and plug sets to equipment requirements.

PART 2 - PRODUCTS

2.1 WIRING DEVICES

A. WEATHERPROOF RECEPTACLES

1. Weatherproof receptacles shall be duplex receptacles as specified under "WIRING DEVICES", mounted in a cast Type FD conduit box and fitting with gasketed cast metal cover with upward operating self-closing cast spring door. Weatherproof receptacles shall be flush mounted in exterior walls. Receptacles mounted on conduit supports must be rigidly supported with no openings, including screwed sealed openings at the top of the box. All boxes must have the required volume capacity for the number of conductors present. All installations must comply with NEC 410-57 and NEC 370-6.

B. WIRING DEVICES

1. Wiring devices shall be as listed. It shall be the responsibility of the Electrical Contractor to provide plugs, receptacles and fittings required for any equipment furnished or installed or connected under the contract. Devices shall be as listed below or equal as listed by addendum. Submit for review all devices to be used.
2. Single Pole Toggle Switch: Silent actuating, 20 amp 120 volt and 277 volt:
   a. Leviton 1221 Series.
   b. Bryant 4901 Series.
3. Three Way Toggle Switch: Silent actuating, 20 amp 120 volt and 277 volt:
   c. Leviton 1223 Series.
   d. Bryant 4903 Series.
4. Receptacles: Duplex, 20 Amp, 125 volt, 3 wire, grounded frame:
   e. Leviton 5362 Series.
   f. Bryant 5362 Series.
5. Self-Contained, Ground Fault Interrupting Duplex Receptacle: 15 Amp, 125 volt, 20 Amp feed through recessed mount with matching face plate. Unless noted otherwise, all additional downstream receptacles on the same circuit as a ground fault interrupting receptacle shall be wired through and protected by the ground fault interrupting receptacle. **Do not** combine neutrals or grounds of ground fault circuits with any other circuit.
   a. Leviton 6599 Series.
   b. Bryant GFR52FT Series.

2. Color: All devices shall be gray.

3. Cord and Plug Sets: Match voltage and current ratings and number of conductors to requirements of the equipment being connected.

   a. Cord: Rubber-insulated, stranded copper conductors, with type SOW-A jacket. Grounding conductor has green insulation. Ampacity is equipment rating plus 30 percent minimum.
   b. Plug: Male configuration with nylon body and integral cable-clamping jaws. Match to cord and to receptacle type intended for connection.

C. Wall Plates: Single and combination types that mate and match with corresponding wiring devices. Features include the following:

1. Plate-Securing Screws: Stainless Steel.
2. Material: 0.04-inch-thick, type 302, satin-finished stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

D. Install devices and assemblies plumb and secure.

E. Install wall plates when painting is complete.

F. Arrangement of Devices: Except as otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

G. Protect devices and assemblies during painting.

3.2 FIELD QUALITY CONTROL

A. Testing: Test wiring devices for proper polarity and ground continuity.

B. Test ground-fault circuit interrupter operation with both local and remote fault simulations according to manufacturer recommendations.

C. Replace damaged or defective components.

3.3 CLEANING

D. General: Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 262726

SECTION 262813– FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fuses

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division1 Specification Sections.

B. Product data for each fuse type. Include the following:

1. Descriptive data and time-current curves.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 “National Electrical Code” for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms “Listed” and “Labeled”: As defined in the “National Electrical Code,” Article 100.
2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” (NRTL) as defined in OSHA Regulation 1910.7.
3. Single-Source Responsibility: All fuses shall be the product of a single manufacturer.

1.5 EXTRA MATERIALS

A. Furnish the following extra materials that match products installed, packaged with protective covering for storage, and with identification labels clearly describing contents.

B. Spare Fuses: furnish quantity equal to 20 percent of each fuse type and size installed, but not less than 1 set of 3 each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide fuses by one of the following;

1. Bussmann Div., Cooper Industries, Inc. , FRS-R, LPS-RK
2. Reliance Fuse, SCLR, ECSR

2.2 PLUG FUSES

A. Type: UL 198F;, Type S, dual element, time delay. Current limiting fuses.

2.3 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1 nonrenewable cartridge fuse,, class as specified or indicated, current rating as indicated, voltage rating consistent with circuit voltage.

B. Main Feeders: Class J time delay.

C. Motor Branch Circuits: Class RK1 time delay.

D. Other Branch Circuits: Class RK5 non-time delay.

E. The fuses shall be rated to meet a maximum AIC rating of 65,000 Amps or as indicated based upon panel serving equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fuses in fusible devices as indicated. Arrange fuses so that fuse ratings are readable without removing fuse.

END OF SECTION 262813

SECTION 262816- DISCONNECTS AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Feeder and equipment disconnects.
2. Enclosed circuit breakers.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 16 Section "Fuses."

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for switches, circuit breakers, and accessories specified in this Section.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code" Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Single-Source Responsibility: All enclosed switches and circuit breakers shall be the product of a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide enclosed switches and circuit breakers by one of the following:

1. Siemens Energy & Automation, Inc.
2. Square D Co.
3. General Electric, Inc.
4. Cutler Hammer, Inc.

2.2 ENCLOSED SWITCHES

A. Enclosed Fusible Switch, 800 Amperes and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position. Disconnects shall be heavy duty type.

B. Enclosure: NEMA KS 1, Type 1, unless specified or required otherwise to meet environmental conditions of installed location.

1. Outdoor Locations: Type 3R. and heavy duty type.
2. Other Wet or Damp Indoor Locations: Type 3R.

C. Switches and fuses shall meet the minimum AIC rating of the distribution panel as indicated.

2.3 ENCLOSED CIRCUIT BREAKERS

A. Enclosed Molded-Case Circuit Breaker: NEMA AB 1, handle lockable with 2 padlocks.

B. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated; interrupting capacity rating to meet available fault current, 10,000 symmetrical rms amperes minimum; with appropriate application listing when used for switching fluorescent lighting loads or heating, air conditioning, and refrigeration equipment.

C. Interchangeable Trips: Circuit breakers, 200 amperes and larger, with trip units interchangeable within frame size.

D. Field-Adjustable Trips: Circuit breakers, 400 amperes and larger, with adjustable short time and continuous current settings.

E. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors and minimum A/C rating indicated.

F. Enclosure: NEMA AB 1, Type 1, unless specified or required otherwise to meet environmental conditions of installed location.

1. Outdoor Locations: Type 3R.
2. Other Wet or Damp Indoor Locations: Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install enclosed switches and circuit breakers in locations as indicated, according to manufacturer's written instructions.

B. Install enclosed switches and circuit breakers level and plumb.

C. Install wiring between enclosed switches and circuit breakers and control/indication devices.

D. Connect enclosed switches and circuit breakers and components to wiring system and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts according to equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

3.2 FIELD QUALITY CONTROL

A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

B. Correct malfunctioning units at site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.

3.3 ADJUSTING

A. Set field-adjustable enclosed switches and circuit breaker trip ranges.

3.4 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

END OF SECTION 262816

SECTION 264300 – TRANSIENT VOLTAGE SURGE SUPPRESSOR

PART 1 - GENERAL

1.1 APPLICABLE STANDARDS AND TESTING

A. Underwriters Laboratories 1449 – (UL 1449 2nd edition is the current safety standard for Transient Voltage Surge Suppressors).

B. Underwriters Laboratories 1283 – (UL 1283 listed as an electromagnetic interference filter that provides noise attenuation).

C. Underwriters Laboratories 67 – (UL 67 listing for internal panelboard TVSS).

D. National Electrical Code 2002 – (NEC Article 285 TVSS Installation practice /NEC Article 250.56 Grounding).

E. NFPA – 78 and CSA – (National Fire Protection Association and Canadian Standards Associations).

F. ISO 9001:2000 – Quality Standard.

G. Military Standards (MIL-STD 220A).

H. IEEE C62.41.1 and C62.41.2 – (System shall be designed to meet American National Standards Institute/Institute of Electrical and Electronic Engineering Inc., C62.41).

I. IEEE C62.45 2002 – (System shall be tested to meet the C62.45).

J. Category A & B – (0.5 CSEC x 100 kHz Ring Wave).

K. Category B3 Biwave – (8 x 20 CSEC at 3,000 Amperes and 1.2 x 50 CSEC at 6,000 Volts).

L. Category C3 Biwave – (8 x 20 CSEC at 10,000 Amperes and 1.2 x 50 CSEC at 20,000 Volts).

M. The fusing elements must be capable of allowing the suppressor's rated single impulse current to pass through the suppressor at least one time without failure. The system shall be tested to 1,000 sequential ANSI/IEEE c62.41.1 and C62.41.2 Category C3 combination wave transients. The Category C3 combination wave is defined as a 1.2 x 50 microsecond wave at 20,000 volt open circuit voltage waveform and 8 x 20 microsecond wave at 10,000 ampere short circuit current waveform. In addition, the system components shall be tested repetitively 1,000 times testing based on and IEEE C62.33 (MOV test) and C62.35 (SAD test) without failure or degradation exceeding + 10%.

N. CBEMA (ITIC) and IEC – (Computer Business Equipment Manufacturers Association or Information Technology Industry Council and International Electrotechnical Commission define clamping voltage tolerance guidelines for sensitive equipment).

1.2 SUBMITTALS

A. Must have fifteen day prior approval to bid on project. Request for submittal must be in writing with the following items:

1. Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, mounting provisions, connection notes, wire size and wiring diagram.

2. Equipment Manual: The manufacturer shall furnish an installation manual with installation notes, start-up and operating instructions for the specified system. Installation instructions shall clearly state whether the system requires an external overcurrent device to maintain the system's UL 1449 listing.

3. CBEMA (ITIC) & IEC – SVRs must meet voltage tolerance guidelines:
   a. SVR clamp levels for wye and single phase (L-N, L-G and N-G): 400-600V for 120V systems, 800-1200V for 277V systems and 1200-1500V for 347V systems
   b. SVR clamp levels for delta circuits (L-L and L-G): 1000-1200V for 240V systems, 1500-1800V for 480V systems and 1800-2000V for 600V systems

PART 2 - PRODUCTS

2.1 BRANCH PANEL PROTECTION

A. Acceptable Manufacturers and Models:

1. Current Technology.
2. General Electric
3. Square D
4. Or approved equal.

B. Equipment shall be a multi-stage parallel protector rated for 120/208 VAC, 3 PHASE, 4 WIRE , plus ground. The equipment's minimum surge current capacity shall be 120 kA per phase (L-N plus L-G) and 120 kA per mode (L-N, L-G, L-L and N-G).

C. The system protection modules shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449.

D. All primary transient paths shall utilize copper wire, aluminum bus bar and lugs of equivalent capacity to provide equal impedance interconnection between phases. No plug-in module or components shall be used in surge carrying paths.

E. Each protection module shall have a visual indicator that signifies that the protection circuitry is on line. The unit shall not be taken off line to verify integrity of system. Redundant status indicators shall be mounted on the front of the door that monitors the system protection circuitry.

F. The system shall be modular with field replaceable modules. Modular units shall contain a minimum of one module per phase.

G. Each protection module shall have a capacitive filtering system connected in each Line to Neutral (LCN)(Wye) ,pde pr Line to Line (LCL)(Delta) mode to provide EMI/RFI noise attenuation (UL 1283).

H. Protection modes: The TVSS shall provide Lie to Neutral (LC)(Wye), Line to Ground (LCG)(Wye or Delta), Line to Lie (LCL)(Delta) and Neutral to Ground (NCG)(Wye) protection.

I. Service Conditions: Rte surge protective device for continuous operation under the following conditions, unless otherwise indicated:

1. MCOV: Maximum Continuous Operating Voltage of 125% or greater.
2. Operating Temperature: 30 to 120 degrees F.
3. Humidity: 0 – 85 percent, noncondensing.
4. Attitude: Less than 20,000 feet above sea level.

J. Equipment shall provide the following monitoring features: digital surge counter, switch and disconnect switch. Equipment shall utilize a NEMA 12 enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The surge suppressor system shall be installed with the shortest lead length possible not to exceed five (5') electrical feet from the power conductor(s) it is protecting, must have a grounding of 25 Ohms (NEC Article 250.56) or less and shall avoid any unnecessary or sharp bends. Utilize a 3 pole 60 amp breaker for connection means.

3.2 WARRANTY AND QUALITY ASSURANCE

A. Manufacturer shall provide a product warranty for a period of not less than five (5) years from date of installation. Warranty shall cover unlimited replacement of TVSS modules during the warranty period.

END OF SECTION 264300

SECTION 265113 -INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes interior lighting fixtures, lamps, ballasts, emergency lighting units, and accessories.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section:

1. "Exterior Lighting Fixtures" for exterior security lighting, roadway and parking lot lighting, poles, and standards.

C. Where a “Standard Specification” (i.e. ANSI, UL, etc.) is referenced and no manufacturers are listed the Contractor shall submit manufacturers for Prior Approval in adherence with the specified standard, and in accordance with Section 260500.

1.3 DEFINITIONS

A. Emergency Lighting Unit: A fixture with integral emergency battery power supply and the means for controlling and charging the battery. They are also known as an emergency light set. Emergency units are available with integral lamps only.

B. Fixture: A complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts required to distribute the light, position and protect lamps, and connect lamps to the power supply.

C. Luminaire: Fixture.

D. Average Life: The time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:

1. Outline drawings of fixtures indicating dimensions and principal features.
2. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.

3. Data on batteries and chargers of emergency lighting units.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide fixtures and emergency lighting units that are listed and labeled for their indicated use on the Project.

1. Special Listing and Labeling: Provide fixtures for use in damp or wet locations, underwater, and recessed in combustible construction specifically listed and labeled for such use. Provide fixtures for use in hazardous (classified) locations that are listed and labeled for the specific hazard.
2. The terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
3. Listing and Labeling Agency Qualification: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Manufacturers Qualifications: Firms experienced in manufacturing fixtures that are similar to those indicated for this Project and that have a record of successful in-service performance.

D. Coordination of Fixtures With Ceiling: Coordinate fixtures mounting hardware and trim with the ceiling system.

PART 2 - PRODUCTS

2.1 FIXTURES, GENERAL

A. Comply with the requirements specified in the Articles below, lighting fixture data sheet at the end of this Section, and lighting fixture schedule.

2.2 FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs and sharp corners and edges.

B. Sheet Metal Components: Steel, except as indicated. Components are formed and supported to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in the operating position.

D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or water white, annealed crystal glass except as indicated.

F.

1. Plastic: Highly resistance to yellowing and other changes due to aging, exposure to heat and UV radiation.
2. Lens Thickness: 0.125 inches, minimum.

2.3 FLUORESCENT FIXTURES

A. Fixtures: Conform to UL 1570, "Fluorescent Lighting Fixtures."

B. Ballasts: Conform to UL 935, "Fluorescent-Lamp Ballasts."

C. Low Temperature Ballast Minimum Starting Temperature: Minus 20 deg C.

D. Ballast for operation of four foot (4') F32T8 rapid start fluorescent lamps shall be as follows:

1. Operate lamps in instant start mode.
2. Operate multiple lamps as parallel circuit, operating remaining lamp(s) at full light output upon failure of other lamp(s) connected to the same ballast.
3. Enclosures shall be painted steel, plastic enclosures are not acceptable.
4. Individual ballasts specifically designed, and UL listed, to operate, one, two, three, or four lamps as scheduled on the drawings.
5. Operate lamps at rated lumen output and life specified by lamp manufacturer.
6. Operate lamps at a frequency higher than 20 kHz.
7. Operate a rated circuit voltage (120 or 277 VAC) at an input frequency of 60 Hz, and tolerate +/- 10% sustained voltage variation without damage to the ballast, and maintain light output at +/- 10% voltage variation.
8. Comply with EMI and RFI limits set by the FCC (CRF 47 Part 18) for non-consumer applications and not interfere with normal electrical equipment.
9. Power factor shall be not less than 0.95.
10. Less than 20% Total Harmonic Distortion.
11. Lamp Crest Factor shall be 1.7 or less.
12. Ballast Factor shall be greater than .85.
13. Sound rating shall be “A”.
14. Shall withstand transients as specified by ANSI C.62.41 for location category A.
15. Meet applicable ANSI standards.
16. A five (5) year warranty.

2.4 HIGH INTENSITY DISCHARGE (HID) FIXTURES

A. Fixtures: Conform to UL 1572, "High-Intensity Discharge Lighting Fixtures."

B. Ballasts: Conform to UL 1029, "High-Intensity-Discharge Lamp Ballasts" and ANSI C82.4, "Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)." Provide ballasts with the following features, except as otherwise indicated.

1. Constant wattage autotransformer (CWA) or regulator, high-power-factor type.
2. Voltage rating matches system voltage.

3. Single-Lamp Ballasts: Minimum starting temperature of minus 30 deg C.
4. Open circuit operation will not reduce the average life.
5. High pressure sodium (HPS) ballasts incorporate a solid-state ignitor/starter with an average life in the pulsing mode of 10,000 hours at an ignitor/starter case temperature of 90 deg C.
6. Noise Suppression: Manufacturer's standard epoxy encapsulated model designed to minimize audible fixture noise.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved shop drawings.

B. Support For Recessed and Semirecessed Fixtures: Install ceiling system support wires at a minimum of four wires per fixture located not more than 6 inches from fixture corners.

1. Fixtures Smaller Than Ceiling Grid: Install a minimum of four wires for each fixture and locate at corner of the ceiling grid where the fixture is located. Do not support fixtures by ceiling acoustical panels.
2. Fixtures of Sizes Less Than Ceiling Grid: Center in the acoustical panel. Support fixtures independently with at least two 3/4-inch metal channels spanning and secured to the ceiling tees.
3. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corners.

C. Lamping: Lamp units according to manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation.

C. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.2 ADJUSTING AND CLEANING

A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.

B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION 265113

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior lighting fixtures, lamps, ballasts, poles standards, and accessories.

B. Related Sections: The following Division 26 Sections contain requirements that relate to this Section:

1. "Interior Lighting" for interior fixtures, lamps, ballasts, emergency lighting units, and accessories.

C. Where a “Standard Specification” (i.e. ANSI, UL, etc.) is referenced and no manufacturers are listed the Contractor shall submit manufacturers for Prior Approval in adherence with the specified standard, and in accordance with Section 260500.

1.3 DEFINITIONS

A. Fixture: A complete lighting unit. Fixtures include a lamp or lamps and parts required to distribute the light, position and protect lamps, and connect lamps to the power supply.

B. Lighting Unit: A fixture, or an assembly of fixtures with a common support, including a pole or bracket plus mounting and support accessories.

C. Luminaire: A fixture.

1.4 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data describing fixtures, lamps, ballasts, poles, and accessories. Arrange product data for fixtures in order of fixture designation. Include data on features, poles, accessories, and the following:

1. Outline drawings of fixtures and poles indicating dimensions and principal features.
2. Electrical ratings and photometric data with certified results of independent laboratory tests.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Comply with ANSI C2, "National Electrical Safety Code."

C. Listing and Labeling: Provide fixtures and accessories that are listed and labeled for their indicated use and location on the Project.

1. Special Listing and Labeling: Provide lighting units for use under water that are specifically listed and labeled for such use. Provide lighting units for hazardous (classified) locations that are listed and labeled for the specific hazard.
2. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
3. Listing and Labeling Agency Qualification: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Manufacturers' Qualifications: Firms experienced in manufacturing lighting units that are similar to those indicated for this Project and that have a record of successful in-service performance.

1.6 STORAGE AND HANDLING OF POLES

A. General: Store poles on decay-resistant treated skids at least 1 foot above grade and vegetation. Support pole to prevent distortion and arrange to provide free air circulation.

B. Metal Poles: Retain factory-applied pole wrappings until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

PART 2 - PRODUCTS

2.1 FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs and sharp edges and corners.

B. Sheet Metal Components: Corrosion-resistant aluminum, except as indicated. Form and support to prevent warping and sagging.

C. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed fixtures.

D. Doors, Frames, and Other Internal Access Provisions: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in the operating position. Provide for door removal for cleaning or replacing lens. Arrange for door opening to disconnect ballast.

E. Exposed Hardware Material: Stainless steel.

F. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Plastic Parts: Resistant to yellowing and other changes due to aging and exposure to heat and UV radiation.

H. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor mounting in fixture doors.

2.2 HIGH-INTENSITY-DISCHARGE (HID) FIXTURES

A. Fixtures: Conform to UL 1572, "High-Intensity-Discharge Lighting Fixtures."

B. Ballasts: Conform to UL 1029, "High-Intensity-Discharge Lamp Ballasts" and ANSI C82.4, "Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)." Provide constant wattage autotransformer (CWA) or regulating high-power-factor type, unless otherwise indicated.

1. Operating voltage matches system voltage.
2. Single-Lamp Ballasts: Minimum starting temperature of minus 30 deg
3. Construct ballasts so open circuit operation will not reduce the average life.
4. Noise: Uniformly quiet operation, with a noise rating of B or better.

2.3 LAMPS

A. Conform to ANSI Standards, C78 series, applicable to each type of lamp. Provide fixtures with indicated lamps. Where lamps are not indicated, provide lamps recommended by manufacturer.

2.4 FINISH

A. Metal Parts: Manufacturer's standard finish except as otherwise indicated. Finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters, and similar defects. Remove poles, fixtures, and accessories showing evidence of corrosion or finish failure during Project warranty period and replace with new items.

B. Other Parts: Manufacturer's standard finish except as otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set units plumb, square, level, and secure according to manufacturer's written instructions and shop drawings.

B. Fixture Attachment: Fasten to indicated structural supports.

C. Lamp fixtures with indicated lamps according to manufacturer's instructions. Replace malfunctioning lamps.

3.2 FIELD QUALITY CONTROL

A. Inspect installed units for damage.

B. Tests: Verify normal operation of lighting units after installing fixtures and energizing circuits with normal power source.

C. Replace or repair damaged and malfunctioning units and retest.

3.3 ADJUSTING AND CLEANING

A. Clean components on completion of installation. Use methods and materials recommended by manufacturer.

B. Adjust aimeable fixtures to provide required light intensities.

END OF SECTION 265600

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 283100- FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. The Electrical Contractor shall furnish and install, complete and ready for operation, an automatic and device-addressable non-coded 24 volt D.C. supervised fire and smoke detection system combined with an alarm and communications system, including a central control panel, with voice evacuation amplifiers, detection and alarm initiating devices, wiring in concealed conduit, all in accordance with the drawings and applicable standards. Comply with NEC 760, NFPA 72, and 90A, and all Federal, State and local laws and ordinances. The Electrical Contractor shall verify that the completed system operates in accordance with this Specification. Systems shall be U.L. and/or F.M. listed and approved.

B. The Electrical Contractor shall engage a Fire Detection System Contractor as a Sub-contractor to coordinate the installation of the work and provide shop drawings for review. The Fire Detection System Contractor shall be one who is regularly employed in the field.

C. Wiring shall be checked and tested by the installing contractor in accordance with the instructions provided by the manufacturer to insure that the system is free of grounds, opens, shorts and that insulation resistance between current carrying conductors is 10 megohms or greater.

D. After the contract, submit to the Architect for review, shop drawings for the Fire Detection System, including but not limited to all components, terminal blocks, wiring diagrams and wiring connections for all points of the system.

E. Submit the final approved shop drawings to the State Fire Marshal for review, paying all fees and complying with all requirements for submittal.

1.2 START UP

A. Upon completion of the installation, perform necessary electrical tests and adjustments, and verify that the system functions and conforms to the requirements of these Specifications. Each device must be individually tested and verified for proper operation. At completion of the tests and adjustments, provide a Letter of Verification indicating that the system functions in accordance with and conforms to all the requirements of the Plans and Specifications.

B. The system shall initiate with the operation of any and all detectors or other input devices operating singly or all simultaneously, and shall operate as follows:

1. All visual and audible alarms shall operate in the building. This alarm sequence shall continue until the signals are silenced or the system has been reset.

2. The proper zone and fire indication shall appear on the main control panel, indicating the status of each input device as per trouble, normal or alarm condition. Alarm conditions to be indicated on remote annunciating panels, where indicated.

3. If an input smoke or heat detector zone device actuates, an alarm indicating lamp

shall light in the base of the detector initiating the alarm; or if the detector is concealed from view, a remote lamp shall light at the nearest visible position.

4. Circuits to energize or de-energize various aspects of the smoke control system as provided under the Mechanical Work shall be actuated. Refer to the Mechanical section of the work and provide for any auxiliary contacts required. When device of an air unit alarms, the air unit shall shut down by action of the fire detection panel.

5. Where a building has a required Fire Protection Sprinkler System, the Fire Detection System shall connect to the flow switches and supervisory pressure switches as separate zones, such that upon the closing of a monitored valve or a loss of Fire Protection Sprinkler System pressure, a supervisory off-normal signal shall occur. Upon activation of a flow switch, the system shall alarm.

6. When the system goes into alarm, it will automatically initiate a digital communicator and initiate a signal indicating that the fire detection system has alarmed.

C. The system shall be capable of being expanded at any time.

D. The system shall be capable of having ionization, thermal, photoelectric and flame detection devices, flow switches or other switched devices and manual stations connected across the same pair of wires all as input devices.

PART 2 - PRODUCTS

2.1 IONIZATION SMOKE DETECTORS

A. Detectors shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector head shall be a plug-in unit containing two ionization chambers, an amplifier switching circuit and indicator lamp. The detector base shall contain the addressable coded signal capability to the network. The amplifier switching circuit shall be entirely solid state. The lamp in the detector shall light continuously to indicate the initiation of the alarm, with a pulsing action to indicate the detector is active. It shall be possible to connect a remote lamp to the detectors. Provide remote indicating lamp mounted in the ceiling directly below or adjacent to any concealed detector. The detector shall contain no moving parts and shall have adjustable sensitivity setting. Units specified for duct mounting shall be specially designed for such a use and be furnished and installed by the Fire Detection System Contractor where called for on the Plans. Coordinate with the Mechanical Section of the work.

2.2 FIRE SUPPRESSION (SPRINKLER) SWITCHES

A. Where zone flow switches and zone and main valve tamper switches are called for on Plans, provide an addressable coded signal suitable for the network.

2.3 CONTROL RELAY DEVICES

A. A control element shall be provided as indicated on drawings. This device shall be connected to the network communications line and be field programmable for one of the following options: Remote Relay (form C, 1 Amp, 120V AC rated) with supervised relay operation, Remote Supervised Indicating Appliance Circuit (fused at 1 Amp). There shall be an LED on the device that will flash to indicate the unit is being monitored, and a steady

LED to indicate the unit has been activated. Use this device for smoke detector/main panel shut-off of HVAC equipment.

2.4 MANUAL FIRE STATIONS

A. The manual fire stations shall be recessed mounted non-breakglass and shall be designed to operate on the input detector circuit. The base of the unit shall contain the addressable coded signal capability to the network.

2.5 AUDIO VISUAL ALARM

A. The system's audio-visual alarms shall be combination single unit type consisting of the basic continuous sounding speaker unit with grille with the visual alarm portion showing "FIRE". The lens shall project from the face of the unit to afford maximum visibility. The visual portion shall be a strobe type light. Alarm shall be for recessed mounting.

2.6 MAIN CONTROL PANEL

A. The control panel shall be microprocessor based and totally power limited. The panel shall be capable of supporting Class A (Style 6) or Class B (Style 4) network communications lines and Class A (Style Z) or Class B (Style Y) indicating appliance circuits. The panel shall have the following features:

1. Totally Field Programmable
2. Password Access Protection
3. Built-In Panel Diagnostics
4. Alarm and Trouble Resound
5. Alarm Event Buffer
6. Trouble Status Buffer
7. Point Identification Display
8. 24 Hour Trouble Resound
9. One Man Walk Test
10. Alarm Verification
11. Positive Alarm Sequence
12. The panel shall have the following relays with a form C configuration:
13. Alarm
14. Trouble
15. Supervisory

16. Default Alarm Mode (allows alarm reporting during microprocessor failure)

B. The control panel shall be designed to monitor two or four network communications lines. The system shall process up to 128 addressable inputs (smoke detectors, manual fire stations, water flow devices, etc.) and up to 128 addressable control relays. The network communications lines shall each be indicated through various annunciation devices such as LED annunciators, alphanumeric displays and printers, in addition to the addressable inputs and outputs described above. The control panel shall contain two indicating circuits, supplying 2 amperes of power for each circuit. These circuits shall be field programmable independently to operate a steady, march time or zone coded signaling.

C. The control panel shall provide the necessary power for operation of detectors, audible alarms, trouble signals, internal modules, control relay devices and the audio evacuation initiator modules. The units shall operate from a 2-wire 120 volt power source and be operable over a range of 102-132 volts. The power supply unit shall include power, fire and trouble lamps.

D. Provide an emergency battery back-up in case of power failure sufficient for the entire unit including zone space capability. The secondary (standby) power supply shall be capable of operating the system under maximum normal load for 24 hours and then be capable of operating the system for five minutes in the alarm condition. The power supply for the system shall be suitable for the connected load plus future capacity for 25% expansion. The battery charger shall be a supervised dual mode charger to insure maximum battery life. The constant current and the float voltage (trickle charge) modes shall be controlled by the system microprocessor. The battery charger shall support either sealed or vented nickel cadmium batteries up to 40 AH. The charger shall also monitor the batteries for low voltage or open cell condition.

E. The control panel shall contain an alphanumeric display/printer interface which contains a microprocessor with non-volatile memory to store field programmable alarm and trouble messages. The alphanumeric display shall consist of two 40 character lines for alarm, supervisory and trouble identification, and in normal non-alarm mode, indicates system status. The alphanumerics shall be back illuminated and have an adjustable viewing angle.

1. The detector circuit wiring shall be supervised to detect an open or ground fault on either line and failure of AC power. The alarm device circuit wiring shall be supervised for an open, short or ground fault in either line.

2. Provide a remote indicating panel that will show in a visual manner the trouble and alarm status of each zone in the building. This panel will not have a reset function. Panel to be recessed mounting.

2.7 DIGITAL COMMUNICATOR

A. Provide a multi channel digital alarm communicator transmitter for alarm and trouble signal transmission using incoming phone lines. Installation shall include all interconnecting wiring, power supplies with battery backup, RJ-31X jacks, and other accessory items necessary for a complete and operational system. Proposed equipment shall be equal in every way to Notifire #911A unit as manufactured by Fire Lite Alarms, Inc.

2.8 SYSTEM MANUFACTURER

A. U.L. labeled systems as described above as manufactured and represented locally by EST, Notifier, or equal as listed by addenda are accepted. Prior approvals require fifteen (15) day notice, and must be submitted in writing with cat sheets and equipment manuals.

PART 3 - EXECUTION

3.1 Certain parts of the overall system shall be furnished and installed by other contractors, such as fire protection system flow switches. It is the responsibility of this Contractor to determine the scope of the work, coordinate all activities and provide for all work and materials required. Refer to the Plans and other sections of these Specifications.

3.2 WIRING

A. All wiring shall be installed in a separate conduit system from all other systems. Wiring to be as hereinbefore specified and be copper, 300 volt rating.

B. Controlled output devices shall be supervised to within three feet of the device controlled (air unit starter, horns, door hold open devices, dampers, etc.).

END OF SECTION 283100

DIVISION 31 – EARTHWORK

SECTION 312000 - EARTHWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope: The work included in this section of the specifications includes all labor, materials, equipment, and services necessary for preparing of subgrades for building foundations, slabs, as shown on the drawings.

B. Excavating and Backfilling for Mechanical/Electrical Work: Refer to Divisions 15 and 16 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

C. Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

D. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.

1. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Testing and Inspection Service: The Owner shall employ and pay for a qualified independent geotechnical testing laboratory to perform soil testing and inspection service during earthwork operations.

1.4 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.

1. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective service and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
2. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

C. Use of Explosives: Use of explosives is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.
2. Protect utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Backfill and Fill Materials: A select granular material, such as locally available sand, shall be used as backfill or fill required to reach final design grade. The select fill shall be free of wood, roots, clay lumps, and other deleterious materials and have an organic content no greater than 5% by weight. Sand fill (AASHTO A-3) shall be non-plastic and have no more than 10% by weight of material passing a U.S. Standard No. 200 mesh sieve.

PART 3 - EXECUTION

3.1 SITE PREPARATION

A. Establish adequate temporary and permanent drainage to prevent ponding of water and ensure immediate runoff of all rainfall. Maintain adequate surface drainage away from all foundations during and after construction.

B. Site preparation shall include some limited removal of all existing surficial features such as buildings, pavements, utilities, etc., stripping of existing surficial soils, cutting and filling in some areas to establish final grade

3.2 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. The foundation excavations shall be observed by a representative of the geotechnical engineer prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads. Soft or loose soil zones encountered at the bottom of the footing excavations shall 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 shall be backfilled with compacted structural fill or graded compacted crushed stone, as determined by the Geotechnical Engineer.

C. Footing excavations shall be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water shall be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete shall 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 shall be protected to reduce evaporation or entry of moisture.

3.3 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

D. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

3.4 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas.

Do not trench excavations as temporary drainage ditches.

3.5 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

1. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

3.6 BACKFILL AND FILL

A. General: Place select soil material in layers to required subgrade elevations, using materials specified in Part 2 of this Section.

1. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Architect. Use care in backfilling to avoid damage or displacement of pipe systems.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterprofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
5. Removal of trash and debris from excavation.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.7 PLACEMENT AND COMPACTION

A. Ground Surface Preparation: The existing ground surface beneath the proposed addition and pavement areas shall be stripped of all vegetation, existing pavements, loose topsoil, organic matter, or other deleterious materials to the minimum depth necessary to reach firm undisturbed soil. While this depth may be substantial in localized areas (e.g., within previously existing ditches or excavations), a depth of less than 1 foot should be

adequate over the majority of the site. Actual requirements should be determined by a representative of the geotechnical engineer during construction.

B. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

C. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed by Architect if soil density tests indicate inadequate compaction.

D. Percentage of Maximum Density Requirements:

1. Structural fill placed beneath footings shall be spread in loose lifts of 6 to 8 inches and shall be compacted to at least 95% of its maximum dry density near 2% optimum moisture in accordance with ASTM D 1557.
2. Structural fill used as form beneath a pile supported structure or in depressions or stump holes in excess of 12 inches below slabs shall be compacted to at least 95% of its maximum dry density in accordance with ASTM D 698.
3. General fill shall be spread in loose lifts of 8 to 12 inches and compacted with a minimum of three passes of a D6 bulldozer or equivalent.

3.8 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

B. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum of relative density.

3.9 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed as required by Architect. Density tests shall be performed on each lift of the compacted structural fill. All clearing, filling, and compaction operations shall be accomplished only during periods of dry weather. The contractor shall exercise caution during and after inclement weather to ensure subsoil support is not degraded by construction operations.

3.10 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including excavated material, trash, and debris, and dispose of it off Owner's property.

END OF SECTION 312000

SECTION 31 20 11 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Clearing and grubbing areas specified herein or shown on the drawings to be prepared for other work.
   2. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
   3. Site fill.
   4. Excavating and backfilling trenches for buried utility locations.

B. Work not included in this Section:
   1. Pavement base and subbase
   2. Landscaping topsoils and other features
   3. Bedding and backfill for exterior storm drains, exterior water distribution systems and exterior wastewater collection system.

1.3 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow: Satisfactory soil imported for use as fill or backfill.

D. Clearing: Removal of all items above the ground including bushes, grass, trees, stumps, roots.

E. Excavation: Removal of material encountered above subgrade elevations.
   1. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill or Embankment: Soil materials used to raise existing grades.

G. Structures: Buildings, pile caps, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Each type of plastic warning tape.
2. Geofabrics

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill other than pavement base.
3. Refer to pavement base testing requirements.

C. Contact utility-locator service for area where Project is located before excavating. Locate all existing utilities before excavating.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Site fill
1. Use granular material.

2.2 ACCESSORIES

A. Geofabric: Woven geotextile, made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
   1. Grab Tensile Strength: 200 lbf; ASTM D 4632.
   2. Tear Strength: 75 lbf; ASTM D 4533.
   3. Puncture Resistance: 90 lbf; ASTM D 4833.
   4. Water Flow Rate: 4 gpm per sq. ft.; ASTM D 4491.
   5. Apparent Opening Size: No. 30; ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clear and grub all areas to receive new sidewalks, pavement or similar improvements.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of runoff or airborne dust to adjacent properties, streets, and walkways. In addition, see requirements of SECTION 02450 – SEDIMENT & EROSION PREVENTION PRACTICES.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding developed areas.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
   3. Provide pumping facilities, as necessary to comply with dewatering requirements.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives on this project.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, soil materials, and obstructions.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated grades, lines, depths, and elevations.

B. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

3.6 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect or Engineer.

3.7 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following;
   1. Construction below finished grade including, where applicable, dampproofing and waterproofing.
   2. Surveying locations of underground utilities for record documents.
   3. Inspecting and testing underground utilities as specified.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.

3.8 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. See other specification sections for below slab utility line requirements.

C. Coordinate backfilling with utilities testing.

D. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

E. Place and compact final backfill of satisfactory soil material to final subgrade.

3.9 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Place and compact fill material in layers to required elevations as follows;
1. Under grass and planted areas, use satisfactory fill material.
2. Under walks and pavements, use satisfactory fill material.
3. Under steps and ramps, use building fill.
4. Under pile caps and foundations, use building fill.

3.10 COMPACTION OF BACKFILLS AND FILLS

A. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
1. Under walkways, scarify and recompact top 6 inches (150mm) below subgrade and compact each layer of backfill or fill material to 92 percent.
2. Under lawn or unpaved areas, scarify and recompact top 6 inches(150mm) below subgrade and compact each layer of backfill or fill material at 85 percent.
3. See PAVEMENT BASE AND SUBBASE – SECTION 03 11 23 for pavement base requirements.

3.11 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Grading: Slope grades to direct water away form buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

3.12 FIELD QUALITY CONTROL

A. Provide inspection and testing to verify requirements and tolerances stated in this Section.

B. See additional requirements contained in SECTION 01 45 29 – TESTING LABORATORY SERVICES.

3.13 DISPOSAL OF SURPLUS AND WASTE MATRIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 20 11

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the EPA-Registered Label for termiticide products.

B. Product certificates.

C. Soil Treatment Application Report: Include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

D. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.5 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Three years from date of Substantial Completion.

1.6 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. BASF Corporation, Agricultural Products; Termidor.
b. Bayer Environmental Science; Premise 75.
c. FMC Corporation, Agricultural Products Group; Dragnet FT, Talstar, or Prevail.
d. Syngenta; Demon TC, Prelude, or Probuild TC.

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.2 APPLYING SOIL TREATMENT

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements**,** interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

D. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Crawlspaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
4. Masonry: Treat voids.
5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

E. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

F. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

G. Post warning signs in areas of application.

H. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

SECTION 316200 – DRIVEN PILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies the furnishing and driving of the following types of piling:

1. Treated Timber Piles.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications.

1. Material inspection reports, and mill certificates.
2. Pile installation equipment.

1.4 EXPLORATORY PILES

A. Contractor shall furnish and drive five (5) treated timber exploratory piles. These exploratory piles shall be thirty-five (35) feet long.

B. The locations for these five exploratory piles are indicated on the drawings. The exploratory piles may be driven in permanent location.

C. Exploratory piles shall have tip diameter no more than ½" larger than the minimum diameter indicated on drawings and butt diameters no more than 1" larger than the minimum diameter indicated on the drawings.

1.5 LOAD TESTS

A. After all exploratory piles are driven, the Architect will select one pile to be load tested in compression.

B. Contractor shall provide reaction piles, test beams, plates, etc. to allow Owner's independent testing laboratory to load test the pile 2 weeks after installation of exploratory piles and reaction piles. Reaction piles shall be located a minimum of 7 feet from the test pile and, if left in place, shall not interfere with the location of future permanent piles. The calibrated hydraulic ram and load cell shall be furnished by the testing laboratory.

1. The reaction system shall have the capacity to resist a compression load of 50 tons.

1.4 PROJECT SITE CONDITIONS

A. Available Data - Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpreter conclusions drawn therefrom by Contractor. Data are made available for the convenience of Contractor. Additional test borings and other exploratory operations may be made by Contractor at no cost to the Owner.

B. Contractor Responsibility - The Contractor is required to visit the site prior to the submission of bids. Contractor shall investigate the existing adjacent buildings, sewers, and utilities and shall take proper and necessary precautions to protect same from damage due to the execution of the piling work. Should damage occur due to Contractor's negligence, the cost and responsibility for repairing or replacing the work in its original condition shall be borne by the Contractor at no cost to the Owner.

1.5 QUALITY ASSURANCE

A. The Owner shall employ an independent testing laboratory to perform the following:

1. Treated Timber Piles: Inspect at source of supply and hammer mark in the butt to indicate conformance with the requirements of these specifications.
2. Logging of pile driving: Log the driving of all piling including reaction piles and record the following:
   a. Type of pile.
   b. Date driven.
   c. Hammer description.
   d. Actual dimensions of piles. Tip, Butt Length; all measured at the job site. Pile dimensions measured at the source of supply are not acceptable.
   e. Location of pile.
   f. Number of blows per foot for full length of pile, logged from foot marks on the pile.
   g. Elevation of driving grade.
   h. pre-drilling data; size, depth, wash-out as required.
   i. Length of time required for each sequence of the work.

   Submit driving records daily, no later than morning after driving.

3. Pile Load Test: The Testing Laboratory shall perform the load test as indicated in paragraph 1.5. Load test shall meet the requirements of the New Orleans Building Code and ASTM D1143. Laboratory shall furnish an accurately calibrated hydraulic jack and load cell with a capacity of not less than 50 tons.

4. Loading Procedure For Treated Timber Pile shall be as follows: Begin Load Test no sooner than fourteen (14) days after driving pile to be tested, and reaction piles.

Increment	Load (Tons)	
1	2	
2	4	Hold each increment
3	6	1 thru 4, 1-hour
4	8	free of movement.
5 Begin Rebound	6	
6	4	Hold each decrement
7	2	5 thru 7, 15 minutes.
8	0	Hold 1-hour free of movement.
9 Begin Reload	2	
10	4	
11	6	Hold each increment
12	8	9 thru 14, 15 minutes.
13	10	
14	12	Hold each increment
15	13	15 thru 26, 1- hour
16	14	free of movement
17	15	
18	16	If piles begins to fail
19	17	before reaching 16 tons,
20	18	rebound in 4 equal
21	20	decrements from failure load.
22	22	
23	24	
24	26	
25	28	
26	30	2 ton increments to failure Hold each increment 1-hour free of movement. After failure, rebound in 4 equal decrements from failure load.

5. Vibration Study: During the driving of all piles, including exploratory piles and reaction piles, the laboratory shall monitor and record the vibrations to adjacent and surrounding areas. The laboratory shall employ the services of a vibration specialist engineer who in conjunction with the laboratory shall render complete reports and interpretations of the data obtained, including the possible effects of the measured vibrations on adjacent and surrounding structures. The vibrations shall be measured by means of a portable Seismograph which directly measures particle velocity (rate of ground movement) in three mutually perpendicular directions (longitudinal, transverse, and vertical). Probes shall be located at various locations as directed. In addition to daily reports, a complete report of the vibration study, including seismograms, shall be furnished after the conclusion of the driving of the exploratory piles and reaction piles.

PART 2 – PRODUCTS

2.1 TREATED TIMBER PILES

A. Shall meet ASTM Designation D25 (latest revision) round timber piles for quality, clean peeled, Southern Pine with a minimum 6 inch tip diameter and a minimum 8 inch butt diameter.

B. Solution For Brush Treatment: Copper Napthenate confirming to AWPA Specification M4.

C. Preservative Treatment: Comply with AWPA Standards P5-02, C1-03 and C3-03 with minimum net retention of 0.80 lbs. Per cu. ft. of wood and penetration as required for foundation piles. Preservative shall be C.C.A.

D. Contract Length: As shown on drawings.

E. Test Pile Length: 35 feet

PART 3 – EXECUTION

3.1 HANDLING

A. Piles shall be carefully handled and transported at the mill or plant, to the jobsite and on the jobsite.

3.2 PREDRILLING

A. Predrilling is required for all piles. For each pile, drill a hole using a 3-Blade Demon SH-800 with a 6” diameter bit to a depth of 22’ below existing ground surface. Immediately thereafter drive the pile into the drilled hole. Use a minimum amount of water during the drilling operations. The Architect may require the Contractor to change the depth and size of the pre-drill. If this is necessary, it shall be done at no additional cost to the Owner.

3.3 DRIVING

A. Driving Equipment: All driving equipment shall be subject to the Architect's review, and if at any time, in the Architect's opinion, does not perform its intended task adequately, it shall be rejected.

B. Air driven hammers shall be used. A Vulcan 2 hammer (7,260 ft. lbs per blow) shall be used for the treated timber piles.

C. Driving Procedure:

1. Driving shall be done with fixed leads that shall hold the pile firmly in position and in alignment with the hammer. Provide templates as necessary to insure proper

location. The top of the pile shall be protected with a standard steel hood or similar type device.

2. Drive pile continuously until proper penetration as determined by the Architect is obtained.
3. Cutoff piles on a neat horizontal plane without damaging pile and remove cutoff portions from the jobsite.

3.3 LOCATION

A. Piles shall be driven plumb and accurately into position as shown on Drawings. A maximum variation not exceeding 3" for each pile in a cluster will be accepted as fulfillment of contract, providing limiting and controlling conditions make it impossible to maintain more accurately the location indicated on the Drawings. Maximum tolerance from the vertical shall be 1.5 feet in 100 feet.

3.5 DEFECTIVE PILES

A. Any pile which is damaged, deflected, or broken, or any pile which cannot be driven to proper tip penetration shall be immediately removed and replaced with an acceptable substitute pile at the location determined by the Architect. In the event that such removal should prove impossible, the defective pile shall be abandoned and a suitable pile or piles shall be driven close to the worthless one where the Architect directs.

END OF SECTION 316200

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 32 10 00 - SIDEWALKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section shall cover site work concrete constructed upon the prepared subgrade and in conformance with the lines, grades, thickness, and cross sections shown. Construction shall include the following:

B. Pedestrian Pavement: Walks and wheelchair curb ramps.

1.2 RELATED WORK

A. Laboratory and Field testing Requirements: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 DESIGN REQUIREMENTS

Design all elements with the latest published version of applicable codes.

1.4 WEATHER LIMITATIONS

Placement of concrete shall be as specified under Article 3.8, COLD WEATHER and HOT WEATHER in ACI Publication 301-05, “Specifications for Structural Concrete.”

1.5 SUBMITTALS

Furnish the following:

A. Manufacturer’s Certificates and Data certifying that the following materials conform to the requirements specified.
   1. Expansion joint filler.
   2. Hot poured sealing compound.
   3. Reinforcement.
   4. Curing materials.

B. Data and Test Reports: Select base material.
   1. Job-mix formula.
   2. Source, gradation, liquid limit, plasticity index, percentage of wear, and other tests as specified and in referenced publications.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Refer to the latest edition of all referenced Standards and codes.

B. American Society for Testing and Materials (ASTM):

C94/C94M…….Ready-Mixed Concrete

C. American Concrete Institute ACI 301-05…..Specifications for Structural Concrete

PART 2 - PRODUCTS

2.1 CONCRETE

Cement shall be Type C. Use of air-entrainment or slag cement is prohibited. Maximum slump shall be three (3) inches. Minimum ultimate 28 day compressive strength shall be 3500 psi.

2.2 REINFORCEMENT

A. The type, amount, and locations of steel reinforcement shall be as shown on the drawings and in the specifications.

B. Welded wire-fabric shall conform to AASHTO M55.

C. Dowels shall be plain steel bars conforming to AASHTO M31 or M42. Tie bars shall be deformed steel bars conforming to AASHTO M31 or M42.

2.3 SELECT BASE

A. Base material shall consist of select granular material composed of granular material consisting of material sand with 95% by weight falling between the No. 16 and No. 200 screen sieve, a maximum liquid limit of 25 and a maximum plasticity index of 6.

B. Base material shall produce a compacted, graded course, meeting the density requirement specified herein.

2.4 FORMS

A. Use metal or wood form that are straight and suitable in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete, for the work involved.

B. Do not use forms if they vary from a straight ling more than 1/8 inch in any ten foot long section, in either horizontal or vertical direction.

C. Wood forms should be at least 2 inches thick nominal. Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for forming radii.

2.5 CONCRETE CURING MATERIALS

A. Concrete curing materials shall conform to one of the following:
1. Burlap conforming to AASHTO M182 having a weight of seven ounces or
more per square yard when dry.
2. Liquid membrane curing compound conforming to ASTM C309, Type 1
and shall be free of paraffin or petroleum.

2.6 EXPANSION JOINT FILLERS

A. Material shall conform to AASHTO M213.

PART 3 - EXECUTION

3.1 SUBGRADE PENETRATION

A. Prepare and proof roll the subgrade with at least 3 passes of equipment.

B. Maintain the subgrade in a smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

3.2 SELECT BASE

A. Place the material on the prepared subgrade in a uniform layer to the required
contour and grades, and to a loose depth not to exceed 6 inches, and that when
completed, will produce a layer of the designated thickness.

B. Perform compaction with approved mechanical equipment well suited to the material being compacted.

C. Moisten or aerate the material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

D. Compact each layer to at least 97 percent of maximum density as determined by ASTM D698.

E.. Maintain the finished base in a smooth and compacted condition until the concrete has been placed.

F. When Contractor's subsequent operations or adverse weather disturbs the approved compacted subbase, excavate, and reconstruct it with new material meeting the requirements herein specified, at no additional cost.

3.3 SETTING FORMS

A. Form Setting:

1. Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines.
2. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction.
3. Forms shall conform to line and grade with an allowable tolerance of 1/8 inch when checked with a straight edge and shall not deviate from true line by more than 1/4 inch at any point.
4. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing.
5. Clean and oil forms each time they are used.
6. Make necessary corrections to forms immediately before placing concrete.
7. When any form has been disturbed or any subgrade or base has become unstable, reset and recheck the form before placing concrete.

3.4 PLACING REINFORCEMENT

A. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the reinforcement.

B. Before the concrete is placed, the reinforcement, shall be accurately and securely fastened in place with suitable supports and ties. The type, amount, and position of the reinforcement shall be as shown.

3.5 PLACING CONCRETE - GENERAL

A. Advise Testing Laboratory and Engineer one (1) working day before placing concrete so that an examination of the formed area can be made.

B. Remove debris and other foreign material from between the forms before placing concrete.

C. Before the concrete is placed, uniformly moisten the base course avoiding puddles of water.

D. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.

E. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets.

3.6 PLACING CONCRETE FOR PEDESTRIAN PAVEMENT

A. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform to the cross section as shown.

B. Deposit concrete as near to joints as possible without disturbing them but do not dump on a joint assembly.

C. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment.

D. Finish the surface to grade with a wood or metal float.

E. All concrete shall be constructed with sufficient slope to drain properly.

3.7 CONCRETE FINISHING - GENERAL

A. The sequence of operations, unless otherwise indicated, shall be as follows:
1. Consolidating, floating, straight-edging, troweling, texturing and edging of joints.

3.8 CONCRETE FINISHING PEDESTRIAN PAVEMENT

A. Walks and Wheelchair Curb Ramps:
1. Finish the surfaces to grade and cross section with a metal float, trowled smooth and finished with a broom moistened with clear water.
2. Brooming shall be transverse to the line of traffic.
3. Finish all slab edges, including those at formed joints, carefully with an edger having a radius as shown on the drawings.
4. Unless otherwise indicated, edge the transverse joints before brooming. The brooming shall eliminate the flat surface left by the surface face of the edger. Execute the brooming so that the corrugation, thus produced, will be uniform in appearance and not more than 1/16 inch in depth.
5. The completed surface shall be uniform in color and free of surface blemishes, form marks, and tool marks. The finished surface of the pavement shall not vary more than 3/16 inch when tested with a 10 foot straightedge.
6. Minimum thickenss of pedestrian pavements shall be four (4) inches. The thickness of the pavement shall not vary more than 1/4 inch.

3.9 JOINTS - GENERAL

A. Place joints, where shown, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface.

B. Joints shall be straight and continuous from edge to edge of the pavement.

3.10 CONTRACTION (OR DUMMY) JOINTS

A. Cut joints to depth as shown with a grooving tool or jointer of a radius as shown or by sawing with a blade producing the required width and depth.

B. Finish edges of all joints with an edging tool having the radius as shown on the drawings.

C. Score pedestrian pavement with a standard grooving tool or jointer.

3.11 EXPANSION JOINTS

A. Use a preformed expansion joint filler material of the thickness as shown to form expansion joints.

B. Material shall extend the full depth of concrete, cut and shaped to the cross section as shown, except that top edges of joint filler shall be below the finished concrete surface where shown to allow for sealing.

C. Anchor with approved devices to prevent displacing during placing and finishing operations.

D. Round the edges of joints with an edging tool.

E. Form expansion joints as follows:
1. Use dowel basket.
2. Using joint filler of the type, thickness, and width as shown.
3. Installed in such a manner as to form a complete, uniform separation within pavement.

3.12 CONSTRUCTION JOINTS

A. Locate longitudinal and transverse construction joints between slabs of vehicular pavement as shown.

B. Place transverse construction joints of the type shown, where indicated and whenever the placing of concrete is suspended for more than 30 minutes.

C. Use a butt-type joint with dowels for transverse joints.

D. Use keyed joints with tiebars for longitudinal joint.

3.13 FORM REMOVAL

A. Forms shall remain in place at least 12 hours after the concrete has been placed. remove forms without injuring the concrete.

B. Do not use bars or heavy tools against the concrete in removing the forms. promptly repair any concrete found defective after form removal.

3.14 CURING OF CONCRETE

A. Cure concrete by one of the following methods appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. Provide protection as necessary to prevent cracking of a pavement due to temperature changes during the curing period.

B. Burlap Mat: Provide a minimum of two layers kept saturated with water for the curing period. Mats shall overlap each other at least 150 mm (6 inches).

C. Liquid Membrane Curing:

1. Apply pigmented membrane-forming curing compound in two coats at right angles to each other at a a rate of 200 square feet per gallon for both coats.
2. Do not allow the concrete to dry before the application of the membrane.
3. Immediately re-spray any area covered with curing compound and damaged during the curing period.

3.15 CLEANING

A. After completion of the curing period:

1. Remove the curing material (other than liquid membrane).
2. Sweep the concrete clean.
3. After removal of all foreign matter from the joints, seal joints as herein specified or shown on drawings.

4. Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.

3.16 PROTECTION

The contractor shall protect the concrete against all damage prior to final acceptance by the Owner. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the entire section between regularly scheduled joints, when directed by the Engineer, and at no additional cost. Exclude traffic from vehicular pavement until the concrete is at least twenty-one (21) days old, or for a longer period of time if so directed by the Engineer.

3.17 FINAL CLEAN-UP

Remove all debris, rubbish and excess material from the construction site.

END OF SECTION 32 10 00

SECTION 32 11 16 - PAVEMENT BASE & SUBBASE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. Related Sections:
   1. Section 01 45 29 – Testing
   2. Section 31 20 11 - Earthwork

1.2 DESCRIPTION

A. Work included:
   1. Furnish and place base materials on a prepared surface.
   2. All work to be in close conformity with the lines, grades, thicknesses, materials, densities and cross sections shown on the plans or described herein.

1.3 DEFINITIONS

A. Base
   1. Base is the surface or plane directly beneath the pavement.
   2. Base material is that material which is between the base and the subbase or subgrade.

B. Subbase
   1. Subbase is the surface or plane that lies directly below the base material and separates the base material from the subbase material.

C. Subgrade
   1. Subgrade is the surface or plane which lies below the base or subbase materials and separates the embankment form the natural ground.
   2. Subgrade soils are the existing insitu soils.

1.4 REFERENCED SPECIFICATIONS

A. Unless otherwise specified herein all work and material shall conform with the requirements of the Louisiana Department of Transportation and Development (L.D.O.T.D.) “Louisiana Standard

Specifications for Roads and Bridges", 2006, Section 301, Section 302, and related specified sections.

B. Other Standards
1. A.S.T.M. - American Society of Testing Materials
2. A.C.I. - American Concrete Institute
3. A.A.S.H.T.O. - American Association of State Highway and Transportation Officials "Standard Specifications for Transportation, Materials and Methods of sampling and testing.

1.5 QUALITY ASSURANCE

A. Comply with testing requirements contained in this section and in Testing Laboratory Services – Section 01 45 29.

PART 2 – MATERIALS

2.1 Unless noted otherwise on the plans material shall conform to the following
specification.

A. Base for Portland Cement Concrete Pavement shall be granular material consisting of natural sand with 95% by weight falling between the No. 16 and the No. 200 screen sieve, a maximum liquid limit of 25, and a maximum plasticity index of 6. Material shall be free of trash, roots and weeds. Base shall be compacted to a minimum of 97% of maximum dry density based on ASTM D698.

B. Geofabrics for pavements where shown to be used shall conform to the following requirements.
1. Geotextile shall be Mirifi 600x, Amoco 4552, or Contek C300.
2. Geogrid shall be Tensar BX1100.
3. Geofabrics will be installed in accordance with manufacturer's recommendations.
4. Where cut for installation of utilities geofabrics will be replaced in accordance with Engineer's requirements.

PART 3 – EXECUTION

A. All work shall be in conformance with the requirements of LDOTD specifications unless noted otherwise.

B. The ground surface shall be excavated to the lines and grades conforming to the bottom of the pavement or selected base material.

C. Remove all visible deleterious material including large roots, stumps, logs, etc. Replace with granular material. See Section 31 20 11 – EARTHWORK.

D. Place base in maximum 6” loose lifts, then compacted.

E Compact all subbase, and base to achieve specified density.

F. Arrange for testing laboratory to perform field density test before scheduling pavement operation. Pavement shall not be placed until base and subbase densities are found to be acceptable.

G. If the base is subject to rainfall or is otherwise disturbed by water intrusion, the base shall be subject to be repaired, compacted, and retested by the testing laboratory before pavement is placed.

END OF SECTION 32 11 16

SECTION 32 05 23 – PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED:

A. Refer to drawings for location of concrete pavements.

B. Construct in close conformity with these specifications and the lines, grades, slopes, sections, thickness, and strength shown on the plans.

1.3 REFERENCED SPECIFICATIONS

A. L.D.O.T.D. – Louisiana Department of Transportation and Development, Office of Highways “Louisiana Standard Specifications for Roads and Bridges”, 2006 edition.

B. A.S.T.M. – American Society of Testing and Materials latest revision of referenced specifications.

C. A.A.S.H.T.O. – American Association of State Highway and Transportation Officials “Standard Specifications for Transportation Materials and Methods of Sampling and Testing”, latest edition.

D. A.C.I. – American Concrete Institute. – ACI 301-99.

1.4 SUBMITTALS

A. Product Data – Submit manufacturer’s/supplier’s data and certification of conformance for all materials.

1.5 QUALITY ASSURANCE

A. Comply with testing requirements contained in this section and as stated in Testing Laboratory Services – Section 01 45 29.

B. The Contractor shall maintain a paving plan showing the exact areas and date concrete placement occurred. This plan shall be available at the site for reference by the testing laboratory and Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement shall conform to A.S.T.M. C 150, Type I Specifications.

B. Fly ash and slag cement are not permitted.

C. Coarse aggregate shall be clean, hard, durable rock or gravel. Coarse aggregate shall conform to A.S.T.M. C33-latest specifications. Gradation shall be according to size number 467 or size number 57.

D. Fine aggregate shall be clean natural sand and shall conform to A.S.T.M. C33 latest specifications.

E. Water used in mixing concrete shall be potable water fit for human consumption.

F. Admixtures
1. Air-entraining admixtures shall not be used.
2. Water-reducing admixtures shall conform to A.S.T.M. C494 latest specifications.
3. Water-reducing retarding admixtures shall conform to A.S.T.M. C494, Type C.
4. Superplasticizer shall conform to A.S.T.M. C494—92 Type F water reducing, high range admixture.

G. Curing compound shall be a white-pigmented impervious membrane. Curing compound shall conform to A.S.T.M. C309, Type 2 specifications.

H. Tie-bars shall be deformed reinforcing steel bars conforming to A.S.T.M. A 615, Grade 40 specifications. Tie bars shall be secured by two metal stakes.

I. Metal parting strips used to form keyed joints shall be 16 gauge plain,

painted or galvanized steel shaped as shown on the plans. Metal parting strips shall have punched holes for tie-bars and supporting pins and conform to the dimensions shown on the plans. Lap parting strips two inch (2") minimum.

J. Load Transfer Devices
Load transfer devices shall conform to the types and details shown on the drawings.

2.2 CONCRETE MIXTURE

A. The specified twenty-eight (28) day compressive strength (f'c) shall be 4000 psi. Concrete shall be designed with a water-reducing admixture and the slump shall not exceed four (4) inches.

B. The Contractor shall submit the proposed concrete mix design to the project testing laboratory and Engineer. No concrete shall be placed until the mix design has been reviewed by the Engineer and Testing Laboratory.

PART 3 - EXECUTION

3.1 CONCRETE PAVEMENT

A. Base shall be in place and tested and accepted for proper compaction and
thickness before placing concrete.

B. Forms, joint hardware, load transfer devices, and inserts shall be in place
and properly secured prior to concrete placement.

C. Any change to jointing layout shown on drawings must be submitted to
Architect for review/approval prior to construction.

D. Contractor shall notify testing laboratory, Architect and Engineer 24 hours
on advance of concrete placement.

E. Contractor shall have adequate workmen and equipment on site before
commencing concrete placement.

F. Concrete shall not be placed on base that is wet or disturbed.

G. Concrete shall be properly placed and consolidated in accordance with ACI 301. Use full width machine finishing or screed with proper mechanical vibratory for consolidation. After strick off and consolidation, concrete shall be trued using the longitudinal float method or pan float method.

H. Final texture shall be obtained by broom finishing to produce surface corrugations of not more than 1/16 inch in depth.

I. After finishing but before concrete has set, edges of pavement, transverse joints, and longitudinal construction joints shall be tooled and rounded as shown on the drawings.

J. The entire placement and finishing operation shall be performed in a continuous manner.

3.2 CURING, JOINT SEALING, AND OPENING TRAFFIC

A. Curing
   1. After finishing and tooling of joints, entire surface of all concrete shall receive a coating of a white pigmented curing compound.
   2. Curing compound shall be applied in a continuous manner in accordance with the manufacturer's recommendations.
   3. After removal of the forms, sides of slabs and curbs shall receive curing compound.

B. Opening to Traffic
   1. Pavement shall not be opened to any traffic until twenty-one (21) days after placement.
   2. No traffic shall be allowed on pavement until all joints are sealed.
   3. If compressive test results indicate a possible deficient concrete strength, pavement shall not be opened until concrete compressive strength test indicate the required strength has been achieved.

3.3 FINAL INSPECTION AND ACCEPTANCE

A. Final Inspection

1. The Contractor shall notify the Engineer forty-eight (48) hours in advance of the time he wished to have the final inspection.

B. Surface Smoothness Requirements:
   1. When tested with a ten (10) foot rolling straightedge by test method L.D.O.T.D. TR618 not more than ten (10%) of each two hundred (200) linear feet of lane width shall have surface deviations in excess of one-fourth inch (1/4”).
   2. When a greater percentage of a two hundred (200) linear foot segment shows deviation exceeding one-fourth inch (1/4”) or when pavement areas have deviations in excess of three-eights inch (3/8”), the deficient areas must be ground down to within the one-fourth inch (1/4”) tolerance.
   3. When the surface deviation exceeds five-eights inch (5/8”) in ten (10) feet the pavement shall be removed and replaced by the Contractor.

C. Strength Requirements
   1. For the pavement to be acceptable, the average of all sets of three consecutive twenty-eight (28) day compressive strength tests shall equal or exceed the specified strength (f’c) with no individual strength test result more than five hundred (500) psi below the specified strength. Each strength test shall be the average of two standard test cylinders molded from the same sample of concrete and tested at the same age.
   2. Any section of pavement, where the average of any set of three consecutive tests is below the specified strength (f’c) and any areas of pavement where the average of one set of cylinders shown the concrete to be more than five hundred (500) psi below the specified strength, shall be removed and replaced with concrete having the strength specified. The section to be removed, and replaced with concrete meeting the strength requirements, shall be that area which lies on both sides of the location that the deficient strength tests were obtained and extending both ways either to the end of the placement, the end of the days placement, or halfway to the location of the next adjacent pair of cylinders tested and meeting the minimum strength requirement.

3.4 RECORD PLANS

A. Contractor shall prepare record drawings of the completed work described in this Section. Drawings will show accurately measured

distances and location of all pavements and finished elevations of surfaces. The plan shall be furnished to the Architect and Owner.

END OF SECTION 32 05 23

SECTION 329000 - LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Trees.
2. Shrubs.
3. Ground covers.
4. Plants.
5. Sod.
6. Topsoil and soil amendments.
7. Fertilizers and mulches.
8. Stakes and guys.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products.
2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

C. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of landscape architects and owners, and other information specified.

D. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

E. Planting schedule indicating anticipated dates and locations for each type of planting.

F. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Landscape Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock." Provide a photograph of all trees as indicated on the drawing plant list.

D. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

E. Measurements: Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

C. Trees and Shrubs: Deliver freshly dug trees and shrubs. Do not prune before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery.

D. Handle all stock by the root ball.

E. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Field Engineer before planting.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Warrant the following living planting materials for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.

1. Trees.
2. Shrubs.
3. Ground covers.
4. Plants.

C. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.

D. Replace planting materials that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

E. A limit of one replacement of each plant material will be required, except for losses or replacements due to failure to comply with requirements.

1.9 TREE AND SHRUB MAINTENANCE

A. Maintain trees, shrubs and groundcover by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings. Maintain trees and shrubs for the duration of the job until substantial completion.

1.10 LAWN MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, until substantial completion.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches until irrigation system is fully functional.

1. Water lawn at the minimum rate of 1 inch per week.

D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of lawn area.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown trees, shrubs , ground cover conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

D. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 SOD

A. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

1. Species: Common Bermuda (Cynodon Dactylon)

2.3 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
   1. Topsoil Source: When required, import topsoil from off-site sources. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.4 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.

   1. Provide lime in the form of dolomitic limestone.

B. Aluminum Sulfate: Commercial grade, unadulterated.

C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

F. Peat Humus: For acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.

G. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

   1. When site treated, mix with at least 0.15 lb of ammonium nitrate or 0.25 lb of ammonium sulfate per cu. ft. of loose sawdust or ground bark.

H. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

I. Herbicides: EPA registered and approved, of type recommended by manufacturer.

J. Water: Potable.

2.5 FERTILIZER

A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.6 MULCHES

A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Approved shredded harwood mulch.

2.7 STAKES

A. Upright Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end. (or as indicated on drawings)

B. Tie Wire: ASTM A 641, Class 1, galvanized-steel wire, 2-strand, twisted, No. 12 guage.

C. Hose Chafing Guard: 2-Ply reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

D. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.8 LANDSCAPE EDGINGS

A. Steel Edging: ASTM A 569, rolled edge, standard steel edging, fabricated in sections with loops stamped from or welded to face of sections approximately 24 inches apart to receive stakes. Use Sure-Loc

1. Edging Size: 3/16 inch wide by 4 inches deep.
2. Edging Size: As indicated.
3. Stakes: Tapered steel, 12 inches long.
4. Accessories: Standard tapered ends, corners, and splicers as required.
5. Finish: Standard paint finish; color black.

2.9 WATER MANAGEMENT GEL

A. Water Management Gel: “Horta-Sorb” water gel polymers by Horticultural Alliance, Inc., (800) 628-6373, or approved equal.

3.0 MISCELLANEOUS MATERIALS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's instructions.

B. Slow release watering bags shall be Treegator Original by Spectrum Products, Inc., or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, and secure Landscape Architect’s acceptance before the start of planting work. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

B. Mix soil amendments and fertilizers with topsoil at approved rates. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.

C. For tree pit or trench backfill, mix planting soil before backfilling and stockpile at site.

D. For planting beds and lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

1. Mix lime with dry soil prior to mixing fertilizer. Prevent lime from contacting roots of acid-tolerant plants.
2. Apply phosphoric acid fertilizer, other than that constituting a portion of complete fertilizers, directly to subgrade before applying planting soil and tilling.

3.4 SOD PLANTING PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.

C. Spread planting soil mixture to depth of 4". Do not spread if planting soil or subgrade is frozen.
1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

2. Allow for sod thickness in areas to be sodded.

D. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.

E. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.5 GROUND COVER AND SHRUB BED PREPARATION

A. Remove soil to a minimum depth of 12 inches for groundcover beds and 18 inches for shrub beds and replace with prepared planting soil mixture.

3.6 EXCAVATION FOR TREES AND SHRUBS

A. Pits and Trenches: Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.

1. Balled and Burlapped Trees and Shrubs: Excavate approximately 1-1/2 times as wide as ball diameter and equal to ball depth, plus the following setting layer depth:

a. Setting Layer: Allow 9 inches of planting soil.

2. Container-Grown Trees and Shrubs: Excavate to container width and depth, plus the following setting-layer depth:

a. Setting Layer: Allow 6 inches of planting soil.

B. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill.

C. Obstructions: Notify Field Engineer if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Field Engineer if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

E. Fill excavations with water and allow to percolate out, before placing setting layer and positioning trees and shrubs.

3.7 PLANTING TREES AND SHRUBS

A. Set balled and burlapped stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

1. Place stock on setting layer of compacted planting soil.

2. Remove burlap and wire baskets from tops of balls and partially from sides, but do not remove from under balls. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.

3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. Mix water management gel evenly with the backfill in the upper 2/3 of the planting hole depth leaving untreated the top 1" of soil. Mix at a rate of 1 oz. per inch caliper of tree, or for foot diameter of shrub ball. When pit is approximately 1/2 backfilled, water thoroughly

before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Set container-grown stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

1. Carefully remove containers so as not to damage root balls.

2. Place stock on setting layer of compacted planting soil.

3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. Mix water management gel evenly with the backfill in the upper 2/3 of the planting hole depth leaving untreated the top 1" of soil. Mix at a rate of 1 oz. per inch caliper of tree, or for foot diameter of shrub ball. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

C. Dish and tamp top of backfill to form a 3-inch-high mound around the rim of the pit. Do not cover top of root ball with backfill.

3.8 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs as directed by the Landscape Architect.

B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the Field Engineer, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are size after pruning.

3.9 TREE AND SHRUB STAKING

A. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating balls or root masses. Support trees with 2 strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.10 PLANTING GROUND COVERS

A. Mix water management gel into first 3 to 4 inches of topsoil in ground cover beds at a rate of 1 lb. per 100 square feet.

B. Space ground cover and plants as indicated.

C. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.11 MULCHING

A. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.

B. Organic Mulch: Apply the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

1. Thickness: 3 inches.

3.12 SODDING NEW LAWNS

A. Broadcast water management gel at a rate of 3 lbs. per 1000 square feet over topsoil area to be sodded.

B. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.

C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.

2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

D. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

3.13 INSTALLATION OF EDGINGS

A. Steel Edging: Install steel edging where lawn meets planting beds according to manufacturer's recommendations. Anchor with steel stakes spaced approximately 24 inches apart, driven below top elevation of edging.

3.14 INSTALLATION OF MISCELLANEOUS MATERIALS

A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.

1. When deciduous trees or shrubs are moved in full-leaf, spray with antidesiccant at nursery before moving and again 2 weeks after planting.

3.15 CLEANUP AND PROTECTION

A. During landscaping, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 329000

DIVISION 33 – UTILITIES

SECTION 33 10 00 - WATER DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. The Contractor shall furnish all labor, supervision, materials, equipment, services, and permits necessary to construct the water distribution system as shown on the plans and described herein.

B. Included in the work shall be a complete distribution system including all fittings, valves, tie-ins, connections, fire hydrants, thrust blocks, chlorination and pressure testing. The Contractor shall include in his bid all of the fittings and lengths of pipe necessary to avoid conflicts with other utilities and structures.

1.3 REFERENCED SPECIFICATIONS

A. A.S.T.M. – American Society of Testing Materials

B. A.W.W.A. – American Water Works Association

1.4 SUBMITTALS

A. Product Data - Submit manufacturer’s/supplier’s data and certification of conformance for all materials.

1.5 QUALITY ASSURANCE

A. Comply with testing requirements contained in the referenced documents and as stated in Testing Laboratory Services – Section 1410.

B. Comply with Requirements of the City of Slidell and the Louisiana Department of Health and Hospitals.

C. All material for the fire protection water system shall be Factory Mutual Research approved.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Only pipe, fittings, valves and hydrants manufactured in the United States of America in strict conformance with the Standards specified will be allowed of use on this project.

B. Polyvinyl chloride (PVC) Pipe for sizes four inches (4") through twelve inches (12") shall conform to ASTM D2241. Class 160, with bell and spigot rubber gasket joints. Pipe shall be U.L. Listed.

C. Pipe three inch (3") diameter and smaller shall be PVC pipe conforming to A.S.T.M. D2241, Class 200.

D. Fittings shall be ductile iron with mechanical joints and shall meet A.W.W.A. C110 Class 250, or A.W.W.A. Class 153, Class 350 Specifications.

E. Fittings, pipe and pipe joints shall be of the type and manufacture stated in the notes on the plans.

F. Gate valves in sizes up to and including 12" shall be resilient seated type, meeting AWWA C09 specifications.

G. Valve boxes shall be substantially constructed of high grade cast iron of the heavy duty type for roadway service, with a maximum inside diameter for five and one-fourth inches (5 ¼"). Boxes shall consist of oval base, center sections, top section and cover. Center and top sections shall be of the adjustable screw type suitable for the depth of earth cover specified. Cover shall be of deep socket type with the word "WATER" cast in top.

H. Valve boxes shall be provided with a two (2) foot square by four (4) inch

thick reinforced concrete slab as shown on the plans.

I. All gate valves shall be by one manufacturer.

J. Hydrant shall conform to
1. American-Darling Co.'s B-62-B Dwg. 94-14106
2. R D Wood (Matthews Modernized M-620 Dwg F-24-73257
3. U S Pipe & Foundry Dwg. No. 960021

Provide a lugged tee with tie-rods, nuts and washers at all hydrants in addition to wood blocking.

Backflow preventers shall be double-check valve type with N.R.S. gate valves, FEBCO or approved equal. Provide mechanical joint valve setter and insulated housing.

PART 3 – EXECUTION

3.1 NOTIFICATION

A. Notify the Engineer prior to commencing construction.

3.2 TRENCHING

A. Trenches shall be dug to the required alignment and depth as shown and
noted on the plans. The maximum width of trench shall not exceed the outside diameter of the pipe to be laid plus two (2) feet. The trench shall be shored, braced and drained where necessary to control the maximum width of excavation required.

B. Discharge from dewatering pumps shall be conducted to natural drainage channels or ditches.

C. Pipe will be laid so as to have a minimum cover of three feet and six inches (3'-6"). Depth of cover shall not exceed six feet (6') unless approved or directed otherwise by the Engineer.

D. Trench shall be excavated to the depth required so as to provide a uniform and continuous veering and support for pipe on solid and undisturbed round at every point between bell holes. Any part of trench excavated below specified grade shall be corrected with approved compacted material as directed.

E. Subgrade beneath the centerline of pipe shall be finished to within 0.03 feet of a straight line between pipe joints or batter boards, and all tolerances shall be above the specified grade.

F. Where the bottom of the trench at subgrade is found to be unstable or to include refuse, vegetative or other organic materials, or larger pieces or fragments of inorganic material, contractor shall excavate and remove such unsuitable material to the width and depth ordered. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in three inch (3") uncompacted layers. Layers shall then be compacted so as to provide uniform and continuous bearing and support for the pipe at every point between bell holes.

G. Open-cut trenches shall be sheeted and braced as required by Federal, State, and Parish ordinances, and as may be necessary to protect life, property, and the work. When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering trench either below or through such sheeting. Where sheeting and bracing are used, trench width shall be increased accordingly.

H. When removal of the sheathing or bracing is likely to cause damage to adjacent pavement or construction affect the alignment of the pipe or endanger the trench section in any way, sheathing or bracing shall be left in-place.

3.3 PUMPING

A. Contractor shall keep all excavations free from water while pipe laying and structural work is in progress and to such extent as may be necessary while excavation work alone is being carried on.

B. Well pointing and other dewatering methods may be required due to sandy soil conditions.

3.4 PIPING

A. The water mains shall be laid and maintained to the required lines and grades with fittings, valves and hydrants at the required location. Place in accordance with manufacturer's recommendations.

B. Contractor shall make any adjustments in the line and grade of the water

line to avoid conflicts with existing or proposed utilities. Where existing utilities are known to exist, but exact location and grade are unknown, Contractor shall make excavations and explorations necessary to locate the utilities, protect them against damage and make adjustments in the waterline where necessary to avoid conflicts.

C. Pipe and accessories shall be inspected for defects prior to lowering into trench. Defective, damaged or unsound material shall be removed from the jobsite and replaced with sound material.

D. All foreign matter or dirt shall be removed from the pipe hydrants and valves before lowering into position in the trench. Pipe and accessories shall be kept clean during and after laying. Close ends of pipe when laying is not in progress.

E. Ends of the pipe to be joined, coupling grooves, rubber rings, the bell to be joined, the elastomeric gasket, etc. shall be cleaned immediately before assembly.

F. Prevent pipe from floating by dewatering, backfilling, or other reasonable method.

G. Whenever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plan, to avoid obstructions or plumb stems, or where long-radius curves are permitted. The amount of deflection allowed shall not exceed manufacturer's recommendations.

H. Thrust blocks shall be installed at each change in direction of eleven and one-fourth degrees (11 1/4E) or more, at tees, plugs, caps, deadends, and at fire hydrants. Thrust blocks shall be made with creosote timber. In general, the procedure for determining thrust block size contained in Johns-Mansville "Installation Guide" shall be used and the thrust block constructed accordingly where concrete thrust blocks are used. Timber thrust blocks shall be made by setting two inch (2") by twelve inch (12") planks against the undisturbed soil of the trench wall and appropriate size blocking edged between those planks and fittings or hydrant to be blocked.

All plugs, caps, tees and bends deflecting eleven and one-fourth degrees (11 1/4E) or more unless otherwise indicated, be anchored to prevent movement by providing suitable reaction (Thrust) blocking or metal harness therefore, as shown on the plans or specified herein. All metal harnessing shall be of rigid construction (no cables) and all metal harnessing below the surface of the ground shall be vinyl-coated as required by the coating section of these specifications. Minimum size rod for six inch (6”), eight inch (8”), and twelve inch (12”) pipe is three-quarter (3/4”) inch round.

3.5 VALVE BOXES

A. The valve box shall not transmit shock or stress to the valve and shall be
centered over the trench nut of the valve and plumb with the box cover flush with the surface of the finished pavement or such level as may be directed.

3.6 FIRE HYDRANTS

A. Hydrants shall be located as shown or as directed. The hydrant shall be so
set that the center of the steamer connection will be no less than seventeen inches (17”) nor more than twenty-three inches (23”) above the finished ground when graded in accordance with the elevations and details shown on the plans. When placed behind the curb, the hydrant shall be set so that no portion of the pumper or hose nozzle cap will be less than twelve inches (12”) from the gutter face of the curb. When set in the lawn space between the curb and the sidewalk no portion of the hydrant or nozzle cap shall be within six inches (6”) of the sidewalk. All hydrants shall stand plumb and shall have their nozzle parallel with or at right angles to the curb, with the pumper nozzle facing the curb, except that hydrant having no nozzles 90E apart shall be set with each nozzle facing the curb at an angle of 45E. Hydrants shall be set to the established grade, with nozzles at least seventeen inches (17”) above the finished ground as shown or as directed by the Engineer.

B. Hydrants shall be connected to the water main with a six inch (6”) branch.

C. A drainage pit two feet (2’) in diameter and three feet (3’) deep shall be excavated below each hydrant and filled compactly with crushed stone mixed with coarse sand, under and around the elbow of the hydrant and to a level of six inches (6”) above the waste opening.

No drainage pit shall be connected to the sewer. The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench in accordance with Thrust Blocks requirements.

3.7 BARRICADES, GUARDS AND SAFETY PROVISIONS

A. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be furnished by the Contractor.

3.8 BACKFILLING

A. Sheeting and bracing which left in place at the option of the Contractor must be cut off and removed from the top to a depth of three feet (3') below the bottom of the proposed pavements. Trench bracing except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, except that which has been left in place, may be removed after backfilling has been completed or has been brought to such an elevation as to permit its safe removal

B. Cost of furnishing, placing and removing the sheeting and bracing and the leaving in place of sheeting and bracing shall be included in the price bid for the work.

Trench shall be backfilled by hand with select granular material or river sand and thoroughly compacted to the bottom of the pavement base. Do not use clay or organic matter as backfill.

3.9 HYDROSTATIC PRESSURE AND LEAKAGE TESTS

A. Refer to Section 01410 for testing requirements.

3.10 DISINFECTION OF WATER MAINS

A. The interior of all pipe, fittings, and other accessories shall be kept as free as possible from dirt and foreign matter at all times.

B. The main shall be flushed, prior to chlorination, as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the outlets available. Flushing shall be done

after the pressure test has been made. No hydrant is installed at the end of the main; a tap shall be provided large enough to develop a velocity in the main of at least 2.5 feet per second.

C. Before being placed in service, all new mains and repaired portions of, or extension to existing mains shall be chlorinated so that a chlorine residual of not less than 25 RPM remains in the water after twenty-four (24) hours standing in the pipe. Chlorination will be performed by the Contractor.

3.11 RECORD DRAWINGS

A. Contractor shall prepare record drawings of the completed system. Drawings will show accurately measured distances and location of all pipe, hydrants, valves, building service locations and manholes. Plan shall also indicate depth of pipes below finished grade of pavement, denoting when changes in elevation occur. The plan shall be completed and given to the OWNER and the City of Slidell prior to final inspection.

END OF SECTION 33 10 00

SECTION 33 30 00 – WASTEWATER COLLECTION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK:

A. Work Included:
1. This section covers the construction of the wastewater collection system form the point of collection to the point of disposal.
2. Included in this section are sewer building connections, sewer mains, fittings, manholes, conflict boxes, force mains, connections to and from lift stations and AS-BUILT plans.
3. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the sewage collection system in substantial conformance with the lines; grades, and locations shown on the plans.

1.3 REFERENCED SPECIFICATIONS

A. Those parts of the referenced specifications which are applicable hereto shall be considered as if written herein in full.
1. A.S.T.M: American Society of Testing and Materials.
2. A.W.W.A.: American Water Works Association.
3. A.S.A.: American Standards Association.

1.4 SUBMITTALS

A. Product Data - Submit manufacturer's/supplier's data and certification of conformance for all materials specified in this section.

1.5 QUALITY ASSURANCE

A. Comply with testing requirements contained in this section and as stated in Testing Laboratory Services – Section. 01 45 29.

PART 2 – MATERIALS

2.1 FOUNDATION & BACKFILL

A. Foundation and Embedment Material shall be crushed stone or crushed concrete conforming to the requirements of A.S.T.M. D2321, class I or II as noted.

B. Granular Backfill shall be a natural deposit with ninety five (95%) percent by weight falling between the No. 16 and No. 200 screen sieve and shall have a maximum liquid limit (L.L.) of 25, a maximum plasticity index (P.I.) of 6, and be free of trash, roots and weds.

C. Foundation lumber shall be No. 2 Common Southern Pine.

2.2 GRAVITY PIPE

A. Polyvinyl Chloride (PVC) sewer pipe shall be designed and manufactured to carry sewage by gravity flow and shall met the requirements of A.S.T.M. D3034 Thickwall extra heavy series with a maximum SDR of 35. Joints for PVC pipe shall consist of an integral cast bell with a factory installed locked in elastomeric gasket conforming to ASTM D-3212. Fitting shall be those manufactured by or approved for use by the manufacturer of the pipe. All fittings shall have the same or greater strength than the pipe.

2.3 STRUCTURES

A. Clay brick shall conform to A.S.T.M. C32.

B. Mortar shall be composed of one part Portland cement, two parts masonry sand and enough water to make a paste.

C. Castings for manholes shall conform to A.S.T.M. A48, Class 20 with the work SEWER cast into the cover. Castings shall be made within THE UNITED STATES, shall be free from cracks, blow holes, mold pull, risers, fins and shall not exceed plus or minus 1/16” linear foot of major dimension. Castings shall be equal to VULCAN FOUNDRY VM9, machine seated weighing 360 lbs.

D. Precast manholes, when approved by the engineer, shall conform to the requirements of ASTM C478.

E. Manhole steps shall conform to ASTM A48.

F. Concrete used in structures shall have a minimum of 5 ½ sacks of cement per cubic yard, a maximum slump of 4", and a specified strength of 3500 PSI @ 28 days.

G. Reinforcing steel shall conform to ASTM A615.

H. No construction when temperature is 32 degrees F. or lower or when the temperature is predicted to go below 32 degrees F. within 24 hours.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Excavations shall be open cuts with vertical sides.

B. Maximum trench open length shall be 100 feet. Open trench shall be marked, lighted, and barricaded.

C. Unauthorized excavations made below required grade shall be backfilled to grade with foundation material at the Contractor's expense.

D. Excavation includes removal of stumps, roots and logs encountered within the trench, and to a depth of 12" below the bottom of the trench.

E. The trench width shall not exceed the dimensions shown on the plans.

3.2 SHEETING & BRACING

A. Contractor shall protect excavations against caving or settling. Protect the sides of the excavation by sheeting and bracing as necessary to support the trench walls and any adjacent structures.

B. The sheeting and bracing shown on the plans is for the purpose of controlling the loading on the pipe only. The Contractor by his operations, the proximity of his equipment to the trench and the weight of this equipment, the location of backfill and construction material relative to the trench, etc. shall increase or decrease the possibility of trench wall collapse and is solely responsible for installing the sheeting and bracing necessary to prevent any collapse.

C. All sheeting and bracing left in the trench shall be cut off a minimum of 3 feet below existing ground surface.

3.3 FOUNDATION

A. Where the foundation is shown on the plans, it is a minimum design section. Any additional material used by the Contractor shall be at the Contractor's expense.

3.4 BACKFILLING

A. Backfilling of sewer trenches shall begin as soon as the joints have been made properly and the location of WYES and TEES properly recorded.

B. Embedment material shall be placed in the trench on top of the foundation on both sides and over the top of the foundation on both sides and over the pipe in accordance with the plan section and compacted to a minimum of 95% of ASTM D698.

C. Granular material shall be placed over the embedment material in layers not to exceed 12" and each layer tamped prior to the placement of the next layer.

3.5 STRUCTURES

A. Lay bricks in full close shove joints of mortar. A reasonable number of half bricks or larger will be allowed along with chips limited in use to filling the spaces between the bricks.

B. Perforated bricks may be used in laying walls of the manholes less than seven feet in height form invert to top of casting and solid bricks shall be used on all others.

C. Brick manholes shall be plastered on the outside and inside with a coat of mortar ¼" thick.

D. Precast manholes shall conform to current ASTM C478.
   a) Precast risers shall be the eccentric cone type.
   b) Sewer openings shall be encased in one section of the manhole.
   c) Manhole steps and cover shall conform to the plan requirements.

E. Manhole foundation slabs shall be constructed on dry bottom. Precast only with written approval of engineer.
   a) Concrete f'c = 3500 PSI @ 28 days.
   b) Base for manhole foundation slab shall be 6" of compacted limestone.

3.6 LAYING GRAVITY PIPE

A. Prior to laying pipe, verify the location and elevation of tie-ins.

B. Lay pipe to line and grades with bell upgrade.

C. Each pipe length shall be clean and laid to form a close joint.

3.7 TESTING AND ACCEPTANCE

A. Refer to Section 01 45 29 for testing requirements.

B. Record Drawings
   1. Contractor shall prepare record drawings of the completed system. Drawings shall show accurately measured distances, location, and invert elevations of all pipe, pipe bends, fittings, building sewer locations and manholes. Plan shall also indicate depth of pipes below finished grade, denoting when changes in elevation or direction occur. The plan shall be completed and given to the OWNER and ENGINEER prior to final inspections.

END OF SECTION 33 30 00

SECTION 33 40 00 – CULVERTS, STORM DRAINS & STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Work consists of furnishing and installing pipe, manholes, junction boxes and catch basins. Work also includes the digging of ditches both temporary and permanent.

B. When not in conflict with these specifications the requirements of L.D.O.T.D., "Louisiana Standard Specifications for Roads and Bridges", 2006 Edition shall govern.

1.3 REFERENCED SPECIFICATIONS

A. Louisiana Department of Transportation and Development, Office of Highways (L.D.O.T.D.). When L.D.O.T.D. is referenced in these specifications, comply with materials and methods of construction and testing contained in "Louisiana Standard Specifications for Roads and Bridges", 2006 Edition and the "Highway Specifications Workbook" latest edition.

B. A.A.S.H.T.O.: American Association of State Highway and Transportation Officials. When A.A.S.H.T.O. is referred to in these specifications it takes the meaning of the specification for materials and methods of testing specified by this association and the specification stated is considered to be a part of the specifications as if written herein in full.

C. A.C.I. American Concrete Institute. When A.C.I. is referred to in these specifications it takes the meaning of the specification for materials and methods of testing specified by this in institute and the specification stated is considered to be a part of the specifications as if written herein in full.

D. A.S.T.M. American Society of Testing Materials. When A.S.T.M. is referred to in these specifications it takes the meaning of the specification for materials and methods of testing specified by this society and the

specification stated is considered to be a part of the specifications as if written herein in full.

1.4 SUBMITTALS

A. Product Data – Submit manufacturer's/supplier's data and certification of conformance for all materials.

1.5 QUALITY ASSURANCE

A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

B. Use equipment adequate in type, size, capacity and numbers to accomplish the work in a timely manner.

PART 2 - MATERIALS

2.1 Materials shall conform to the following requirements

	L.D.O.T.D.
Usable Soil	203.06(a)
Select Soil	203.06(a)
Plastic Soil Blanket	203.10
Mortar	702.02
Portland Cement Concrete	901
Granular Material	1003.07
Bedding Material	1003.08
Reinforced Concrete Pipe	1006.03
Reinforced Concrete Pipe Arch 1006.04	
Gasket Materials	1006.06
Plastic Culvert Pipe	1006.07
Split Plastic Coupling Bands 1006.07(b)(6)	
Geotextile Fabric	1019
Cast-in-Place Concrete (Class M)	901
Portland Cement	1001.01
Mortar Sand	1003.02(b)
Sewer Brick	1004.01
Asphaltic Varnish	1008.03
Metal Work Paint	1008.05
Reinforcing Steel	1009.01
Precast Reinforced Concrete Drainage Units	1016

Manhole Frames, Grates and
1018.04

2.2 QUALITY ASSURANCE

A. The contractor may furnish structures of either cast-in-place concrete or precast concrete units or brick where shown on the plans. For precast structures which are not covered by the plans, design and installation procedures will be submitted for approval.

B. Mortar shall consist of one part Portland cement, two parts mortar sand, and water as required for proper consistency. Mortar shall be used within 30 minutes after mixing.

2.3 MATERIAL TYPE ABBREVIATIONS

A. Reinforced Concrete Pipe:

RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch

B. Plastic Culvert Pipe:

PCP	Plastic Culvert Pipe
PVC	Polyvinyl Chloride Plastic Pipe
PVCCP	Polyvinyl Chloride Culvert Pipe (Smooth Wall)

2.4 JOINT TYPE ABBREVIATIONS

T1	Type 1 Joint
T2	Type 2 Joint
T3	Type 3 Joint

2.5 MATERIAL REQUIREMENTS

A. All round concrete drainage pipe shall conform in all respects to A.S.T.M. C76,
Class II, Wall B, and shall be Bell & Spigot joint with rubber "o" rings.

B. Concrete Arch Pipe shall conform in all respects to A.S.T.M. C-506, Class II and
shall be tongue and groove joints with cold applied preformed plastic sealing compound.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Existing utilities are shown in their approximate location.

B. Contractor shall locate and protect existing utilities prior to excavation.

3.2 LAYING PIPE

A. Pipe laying shall begin at the downstream end of the line. Bell or groove ends of conduit and outside circumferential laps of reverted metal conduit shall be placed facing upstream. Riveted seam metal conduit shall be placed with longitudinal laps at sides. Conduits in each continuous line shall have the same wall thickness. Metal conduits provided with lifting lugs shall be handled only by these lugs.

B. Joint Usage:
1. Type 2 (T2) joints shall be used for cross drains under pavements.

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C. Concrete Conduits: Concrete conduit may be either bell and spigot, or tongue and groove as specified. The method and joining conduit sections shall be such that ends are fully entered and inner surfaces are flush and even. An approved mechanical pipe puller shall be used for joining conduits over 36 inches in diameter. For pipe less than 36 inches in diameter, any approved method for joining conduit may be used which does not damage the pipe. Joints shall conform to Subsection 1006.05, and shall be sealed with gasket material installed in accordance with the manufacturer's recommendations. All joints shall be wrapped with geotextile fabric for a minimum of 18 inches on each side of joint.

D. Plastic Culvert Pipe: Joints for plastic culvert pipe shall be bell and spigot. All joints shall be wrapped with geotextile fabric for a minimum of 18 inches on each side of the joint. The ends of the fabric shall be lapped at least 10 inches. The method of joining conduit sections shall be such that ends are fully entered and inner surfaces are reasonably flush and even. Joints shall be approved and shall be sealed with a gasket system utilizing gasket material conforming to Subsection 1006.06(a)

3.3 BACKFILLING:

A. Pipe found to be damaged or out of alignment or grade shall be removed and reinstalled, or replaced, at Contractor’s expense.

B. Pipe backfill material, placement and compaction shall be compacted granular material.

C. The embankment shall be constructed to a minimum of 2 feet over the pipe before heavy construction equipment is allowed to cross the

installation. Conduit damaged by hauling and backfilling operations shall be removed and reinstalled, or replaced, at Contractor's expense.

D. Backfill Methods:

1. Compaction by flooding will not be allowed.

2. Granular Backfill shall be placed at or near optimum moisture content determined in accordance with DOTD TR 418. Backfill material shall be thoroughly compacted under haunches and then compacted in layers not exceeding 12 inches compacted thickness. Each layer shall be compacted by approved methods to a least 95 percent of minimum density proper to placement of a subsequent layer.

E. Density Requirements: Maximum density will be determined in accordance with DOTD TR 418 and in-place density determined in accordance with DOTD TR 401.

3.4 Constructing Manholes, Conflict Boxes, Catch Basins, Etc.

A. Bricks shall be laid in full, close, shove joints of mortar, according to good work standards. Manholes and catch basins shall be plastered on the inside with a minimum thickness of one-fourth (1/4") inch of mortar. Inverts and benches in manholes shall be surfaced with a one-half (1/2") inch thick layer of cement mortar.

B. Concrete construction shall conform to L.D.O.T.D. Section 805. Joints shall be full mortar joints not more than ½ inch wide. When specified, outside faces of structures shall be plastered with ½ inch thick cement-sand mortar. Exposed surfaces of concrete and masonry shall be cured in accordance with subsection L.D.O.T.D.805.10 for at least 48 hours.

C. Precast concrete units shall be cast with the specified number and size of pipe openings to incorporate the unit into the drainage system. Precast units shall be set to established grade within ±1/2 inch. Joints for sectional precast units shall be sealed with flexible plastic gasket material conforming to L.D.O.T.D. Subsection 1006.06(b) installed as to form a watertight seal. All joints of precast units shall be wrapped with geotextile fabric a minimum of 18 inches on each side of the joint. Ends of the fabric shall be lapped at least 10 inches. The edges and ends of the cloth shall be suitably secured.

D. Metal frames shall be set in a full mortar bed. Conduit sections shall be flush on the inside of structure wall and project outside sufficiently for

proper connection with the next conduit section. Masonry shall fit neatly and tightly around conduit.

E. Structures shall be cleaned of silt, debris or other foreign matter, and nongalvinized metal parts of new or adjusted structures shall be coasted with asphaltic varnish or metalwork paint.

F. All structures shall be backfilled with compacted granular material.

3.5 FINAL INSPECTION AND ACCEPTANCE

A. Prior to requesting final inspection, all drainage work must be complete. All pipe lines and structures must be clean at the time of the final inspection. The Contractor shall supply labor to open and close manholes and catch basins.

B. The Contractor shall arrange for the work to be inspected jointly and concurrently by the Architect or Engineer, with representatives of the City of Slidell. Any misaligned conduit or defective joints shall be corrected at the Contractor's expense.

C. Plastic Pipe

1. Installed plastic pipe shall be tested to ensure that vertical deflections do not exceed 5.0 percent. Maximum allowable deflections shall be governed by the mandrel requirements stated herein.
2. Deflection tests shall be performed no sooner than 30 calendar days after installation and compaction of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing.
3. For pipe 36 inches and less in diameter, a mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. The mandrel shall be approved by the engineer prior to use. Use of an unapproved mandrel or a mandrel altered or modified after approval will invalidate the test. If the mandrel fails to pass, the pipe is overdeflected.
4. Unless otherwise permitted, overdeflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be reinstalled, but shall be removed and replaced with new pipe. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any overdeflection, shall be removed and replaced with new pipe.
5. The mandrel shall be rigid, nonadjustable, odd-numbered legged (minimum 9 legs) mandrel having a length not less than its nominal diameter. The minimum diameter at any point shall be 5.0 percent less than the nominal diameter of the pipe being tested. The mandrel shall be fabricated of steel, fitted with pulling rings at each

end, stamped or engraved on some segment other than a runner with the nominal pipe size and mandrel outside diameter, and furnished in a suitable carrying case.

6. Mandrel testing shall be conducted by the contractor in the presence of the Testing Laboratory.

D. Cleaning Conduit: Prior to final acceptance, conduits installed by the contractor shall be cleansed of all debris and soil & structures.

E. Record Plans: Contractor shall prepare record drawings of the completed drainage system. Drawings shall show accurately measured distances, locations, and invert elevations of all pipe, manholes, drain inlets, building drain service connections, and other important features of the storm drainage system.

END OF SECTION 33 40 00