



**INVITATION FOR BID  
(IFB) #11-0579-OV  
Downtown Bradenton Transit Station  
Location: 601 13<sup>th</sup> Street West, Bradenton  
Manatee County, FL**

Manatee County, a political subdivision of the State of Florida, (hereinafter the "County") will receive sealed bids from individuals, corporations, partnerships, and other legal entities organized under the laws of the State of Florida or authorized to conduct business in the State of Florida.

**NON-MANDATORY INFORMATION CONFERENCE**

In order to insure that all prospective bidders have sufficient information and understanding of the County's needs, an **Information Conference** will be held **February 23, 2011 at 2:00 PM. Location: Manatee County Administration Building, 1112 Manatee Avenue West, 4<sup>th</sup> Floor, Manatee Room 34205.** Attendance is not mandatory, but is highly encouraged.

**REF: B.04 An inspection of the project site shall be acknowledged in Section 00300, Bid Form, page 00300-1.**

**DEADLINE FOR CLARIFICATION REQUESTS: March 4, 2011**  
(Reference Bid Article A.06)

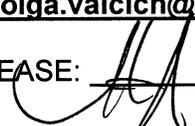
**TIME AND DATE DUE: March 17, 2011 at 2:00 PM**  
Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, FL 34205

This project is funded by the Federal Transit Administration and the Florida Department of Transportation. Bidders shall comply with all Federal and State Guidelines for this procurement.

**Davis-Bacon Act – Prevailing Minimum Wage** is made a part of this Invitation for Bid. The U.S. Department of Labor Wage Rates applicable to this Contract is **Wage Decision Number FL100123 10/08/2010 FL 123 Construction Type: Building Manatee County Florida,** as modified up through ten (1) days prior to the opening of bids. A copy of the Wage Decision Number FL100123 is made a part of this bidding document.

**Important Note:** Lobbying is prohibited (reference Bid Article A.08)

**FOR INFORMATION CONTACT:**  
**Olga Valcich (941) 749-3055/olga.valcich@mymanatee.org**

AUTHORIZED FOR RELEASE: 

**IFB #11-0579-OV / Downtown Bradenton Transit Station  
Location: 601 13<sup>th</sup> Street West, Bradenton, FL 34205**

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SECTION 00010  
**INFORMATION TO BIDDERS**

**A.01 OPENING LOCATION**

These bids will be **publicly opened** at **Manatee County Purchasing, 1112 Manatee Avenue West, Suite 803, Bradenton, Florida 34205** in the presence of County officials at the time and date stated, or soon thereafter. All bidders or their representatives are invited to be present.

Any bids received after the stated time and date will not be considered. It shall be the sole responsibility of the bidder to have their bid **delivered to the Manatee County Purchasing Division** for receipt on or before the stated time and date. If a bid is sent by **U.S. Mail**, the bidder shall be responsible for its timely delivery to the Purchasing Division. Bids delayed by mail shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the respondent's request and expense.

**A.02 SEALED & MARKED**

**One original and two copies** of your **signed bid** shall be submitted in one **sealed** package, clearly marked on the outside **"Sealed Bid #11-0579-OV / Downtown Bradenton Transit Station, Manatee County, FL."**

Address package to:           Manatee County Purchasing Division  
  1112 Manatee Avenue West, Suite 803  
  Bradenton, Florida 34205

**A.03 SECURING OF DOCUMENTS**

Complete individual copies of the bidding documents for the project and/or products can be obtained, free of charge, at the **Manatee County Administration Building located at: 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205; Phone No. 941-749-3014 or 749-3055 between the hours of 8:00 AM to 4:00 PM Monday through Friday,** exception of holidays. Complete set of the bidding document must be used in preparing bids. The County assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of bidding document.

**A.04 BID DOCUMENTS**

**Bids** on <http://www.mymanatee.org>. Bid documents and the Notices of Source Selection related to those Bids are available for download in a portable document format (.PDF) file on the Manatee County web page on the Purchasing tab under "Bids." You may view and print these files using Adobe Acrobat software. You may download a free copy of this software (Adobe) from the County's web page if you do not have it. **Manatee County collaborates with the Manatee Chamber of Commerce** on distributing solicitations using the RFP Tool web page on the Chambers website: <http://www.Manateechamber.com> to post Bid documents in a portable document

A.04 BID DOCUMENTS (Continued)

format (.PDF) file. This step is in addition to the posting on Manatee County Government web pages.

Manatee County may also use an internet service provider to distribute Bids. A link to that service, <http://www.DemandStar.com>, is provided on this website under the Tab "DemandStar". Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Note: The County posts the Notice of Source Selection seven calendar days prior to the effective date of the award.

IT IS THE RESPONSIBILITY OF EACH VENDOR, PRIOR TO SUBMITTING THEIR BID, TO CONTACT THE MANATEE COUNTY PURCHASING OFFICE (see contact information on page one of this document) TO DETERMINE IF ADDENDA WERE ISSUED AND TO MAKE SUCH ADDENDA A PART OF THEIR BID .

A.05 MODIFICATION OF BID SPECIFICATIONS

If a bidder wishes to recommend changes to the bid specifications, the bidder shall furnish in writing, data and information necessary to aid the County in evaluating the request to modify the specifications. The County is not obligated to make any changes to the bid specifications. Unless an addendum is issued, the bid specifications shall remain unaltered. **Bidders must fully comply with the bid specifications, terms, and conditions.**

A.06 DEADLINE FOR CLARIFICATION REQUESTS

**March 4, 2011 (close of business)** shall be the deadline to submit all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids to the Manatee County Purchasing Office.

This deadline has been established to maintain fair treatment for all potential bidders, while maintaining the expedited nature of the Economic Stimulus that the contracting of this work may achieve.

A.07 CLARIFICATION & ADDENDA

Each bidder shall examine all Invitation for Bids documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids shall be made through the Manatee County Purchasing Office. The County shall not be responsible for oral interpretations given by any County employee, representative, or others. The issuance of a written addendum is the only official method whereby interpretation, clarification or additional information can be given.

**A.07 CLARIFICATION & ADDENDA (Continued)**

If any addenda are issued to this Invitation for Bid, the County will Broadcast the addenda on the Demand Star distribution system to "Planholders" on this web service, and post the documents on the Purchasing Division's web page at <http://www.mymanatee.org> which can be accessed by clicking on the "Purchasing" button and then clicking on the "Bids" button. It shall be the responsibility of each bidder, prior to submitting their bid, to contact Manatee County Purchasing (see contact on page 1) to determine if addenda were issued and to make such addenda a part of their bid.

**A.08 LOBBYING**

After the issuance of any Invitation For Bid, prospective bidders, or any agent, representative or person acting at the request of such bidder shall not contact, communicate with or discuss any matter relating in any way to the Invitation For Bid with any officer, agent or employee of Manatee County other than the Purchasing Director or as directed in the Invitation For Bid. This prohibition begins with the issuance of any Invitation For Bid, and ends upon execution of the final contract or when the invitation has been canceled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Purchasing Code.

The County reserves the right to amend or to add to the names listed as persons to contact. All amendments or additions to the names listed as persons to contact shall be issued by the Purchasing Division, in writing.

**A.09 UNBALANCED BIDDING PROHIBITED**

Manatee County recognizes that large and/or complex projects will often result in a variety of methods, sources and prices; however, where in the opinion of the County such variation does not appear to be justified, given bid specifications and industry and market conditions, the bid will be presumed to be unbalanced. Examples of unbalanced bids will include:

1. Bids showing omissions, alterations of form, additions not specified or required conditional or unauthorized alternate bids.
2. Bids quoting prices that substantially deviate, either higher or lower, from those included in the bids of competitive bidders for the same line item unit costs.
3. Bids where the unit costs offered are in excess of or below reasonable cost analysis values.

In the event the County determines that a bid is presumed unbalanced, it will request the opportunity to, and reserves the right to, review all sources quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the bid. The County reserves the right to reject as non-responsive any

**A.09 UNBALANCED BIDDING PROHIBITED (Continued)**

presumptive unbalanced bids where the bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

**A.10 FRONT END LOADING OF BID PRICING PROHIBITED**

Prices offered for performance and/or acquisition activities to occur early in the project schedule, such as: mobilization, clearing and grubbing; or maintenance of traffic, that are substantially higher than pricing of competitive bidders within the same portion of the project schedule, will be presumed to be front end loaded. Front end loaded bids could reasonably appear to be an attempt to obtain unjustified early payments creating a risk of insufficient incentive for the Contractor to complete the work or otherwise creating an appearance of an under-capitalized bidder.

In the event the County determines that a bid is presumed to be front end loaded, it will request the opportunity to, and reserves the right to, review all source quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the pricing or acquisition timing for these bid items. The County reserves the right to reject as non-responsive any presumptive front end loaded bids where the bidder is unable to demonstrate the validity and/or necessity of the front end loaded costs.

**A.11 WITHDRAWAL OF OFFERS**

Vendors may withdraw offers as follows: a) Mistakes discovered before the opening of a solicitation may be withdrawn by written notice from the bidder submitting the offer. This request must be received in the office designated for receipt of offers in the solicitation document prior to the time set for delivery and opening of the offers. A copy of the request shall be retained and the unopened offer returned to that vendor. b) After the responses to a solicitation are opened or a selection has been determined, but before a contract is signed, a vendor alleging a material mistake of fact may be permitted to withdraw their offer if: (1) the mistake is clearly evident on the solicitation document; or (2) the bidder submits evidence which clearly and convincingly demonstrates that a mistake was made. Request to withdraw and offer must be in writing and approved by the Purchasing Official.

**A.12 IRREVOCABLE OFFER**

Any bid may be withdrawn up until the date and time set for opening of the bid. Any bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of 90 days to sell to Manatee County the goods or services set forth in the attached specifications until one or more of the bids have been duly accepted by the County.

**A.13 BID EXPENSES**

All expenses for making bids to the County are to be borne by the bidder.

#### A.14 RESERVED RIGHTS

The County reserves the right to accept or reject any and/or all bids, to waive irregularities and technicalities, and to request resubmission. Also, the County reserves the right to accept all or any part of the bid and to increase or decrease quantities to meet additional or reduced requirements of the County. Any sole response received by the first submission date may or may not be rejected by the County depending on available competition and current needs of the County. For all items combined, the bid of the lowest responsive, responsible bidder will be accepted, unless all bids are rejected. The lowest responsible bidder shall mean **that bidder who makes the lowest bid to sell goods and/or services of a quality which** conforms closest to or most exceeds the quality of goods and/or services set forth in the attached specifications or otherwise required by the County, and who is fit and capable to perform the bid as made.

To be responsive, a bidder shall submit a bid which conforms in all material respects to the requirements set forth in the Invitation For Bid. To be a responsible bidder, the bidder shall have the capability in all respects to perform fully the contract requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance. Also, the County reserves the right to make such investigation as it deems necessary to determine the ability of any bidder to furnish the service requested. Information the County deems necessary to make this determination shall be provided by the bidder. Such information may include, but shall not be limited to: current financial statements, verification of availability of equipment and personnel, and past performance records.

#### A.15 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting agreement. Any involvement with any Manatee County procurement shall be in accordance with Manatee County Purchasing Code of Laws as amended. Any actual or prospective bidder who is aggrieved in connection with the solicitation or award of a contract may protest to the Board of County Commissioners of Manatee County as required in Section 2-26/61 of the Purchasing Code.

A protest with respect to this Invitation For Bid shall be submitted in writing prior to the scheduled opening date of this bid, unless the aggrieved person did not know and could not have been reasonably expected to have knowledge of the facts giving rise to such protest prior to the scheduled opening date of this bid. The protest shall be submitted within seven calendar days after such aggrieved person knows or could have reasonably been expected to know of the facts giving rise thereto.

#### A.16 COLLUSION

By offering a submission to this Invitation For Bid, the bidder certifies that he has not divulged, discussed or compared their bid with other bidder, and has not colluded with any other bidder or parties to this bid whatsoever. Also, bidder certifies, and in the case

A.16 COLLUSION (Continued)

of a joint bid each party thereto certifies as to their own organization, that in connection with this bid:

- a. any prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and/or cost data, with any other bidder or with any competitor;
- b. any prices and/or cost data quoted for this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder, prior to the scheduled opening, directly or indirectly to any other bidder or to any competitor;
- c. no attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition;
- d. the only person or persons interested in this bid, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this bid or in the contract to be entered into; and
- e. no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee excepting bona fide employees or established commercial agencies maintained by bidder for purpose of doing business.

A.17 CODE OF ETHICS

With respect to this bid, if any bidder violates or is a party to a violation of the Code of Ethics of Manatee County per Manatee County Purchasing Code Ordinance 08-43, Article 3, Ethics in Public Contracting, and/or the State of Florida per Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such bidder may be disqualified from performing the work described in this bid or from furnishing the goods or services for which the bid is submitted and shall be further disqualified from submitting any future bids for work or for goods or services for Manatee County. The County anticipates that all statements made and materials submitted in a bid will be truthful. If a bidder is determined to be untruthful in its bid or any related presentation, such bidder may be disqualified from further consideration regarding this Invitation For Bid.

**A.18 BID FORMS**

Bids must be submitted on attached County forms, although additional pages may be attached. **Bidders must fully complete all pages of the Bid Forms for both Bid A and Bid B. Bid Forms must be executed by an authorized signatory who has the legal authority to make the offer and bind the company. Bidders must fully comply with all specifications, terms and conditions.**

**A.19 LEGAL NAME**

Bids shall clearly indicate the legal name, address and telephone number of the bidder. Bids shall be signed above the typed or printed name and title of the signer. The signer must have the authority to bind the bidder to the submitted bid.

**A.20 DRUG FREE WORK PLACE**

The Manatee County Board of County Commissioners adopted a policy regarding bidders maintaining a Drug Free Work Place, prohibiting the award of bids to any person or entity that has not submitted written certification to the County that it has complied with those requirements. A Drug Free Work Place Certification Form is attached to this bid for this purpose.

**A.21 BE GREEN**

All Bidders are encouraged to use as many environmentally preferable "green" products, materials, supplies, etc. as possible in order to promote a safe and healthy environment. Environmentally preferable are products or services that have a reduced adverse effect on the environment. Provide detail of your organization's initiative and its ability to meet the goal of environmental sustainability.

**A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES**

A person or affiliate who has been placed on the State's convicted vendor list following a conviction for a public entity crime, as that term is defined in Florida Statute § 287.133, may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Florida Statute § 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted list.

In addition, the Manatee County Code prohibits the award of any contract to any person or entity who/which has, within the past 5 years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the purchasing official, establishes reasonable grounds to believe the person or business entity will not conduct business in a responsible matter.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES (Continued)

To insure compliance with the foregoing, the Code requires all persons or entities desiring to contract with the County to execute and file with the purchasing official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with the County.

In the case of a business entity other than a partnership or a corporation, such affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, such affidavit shall be executed by the general partner(s). A Public Contracting and Environmental Crimes Certification is attached for this purpose.

A.23 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the bid and not shown separately. The prices as shown on the bid form shall be the price used in determining award.

A.24 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Exempt Cert. No. 59-78-0089K; FL Sales Tax Exempt Cert. NO 85-8012622206C-6); therefore, the vendor is prohibited from delineating a separate line item in his bid for any sales or service taxes. Nothing herein shall affect the vendor's normal tax liability.

A.25 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the specifications, all equipment, materials and articles incorporated in the work covered by this contract shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the specifications, reference to any equipment, material, article or patented process, by trade name, brand name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

A.26 AMERICANS WITH DISABILITIES ACT

The Board of County Commissioners of Manatee County, Florida, does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of the County's functions including one's access to, participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation for an **Information Conference** or **Bid Opening** should contact the person named on the first page of this bid document at least twenty-four (24) hours in advance of either activity.

A.27 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

Manatee County, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all vendors that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for an award.

A.28 MBE/WBE

The State of Florida, **Office of Supplier Diversity** provides the certification process and the database for identifying certified MBE/WBE firms. This service may be directly accessed at: <http://www.osd.dms.state.fl.us/iframe.htm>

If you have any questions regarding this State service, please contact their office at (850) 487-0915.

A.29 MATHEMATICAL ERRORS

In the event of multiplication/extension error(s), the unit price shall prevail. In the event of addition error(s) the extension totals will prevail. All bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.30 DISCLOSURE

Upon receipt, all inquires and responses to inquires related to this Invitation for Bid become "Public Records" and are subject to public disclosure consistent with Chapter 119, Florida Statutes.

**Bids become "Public Records" ten (10) days after the bid opening or if an award decision is made earlier than this time as provided by Florida Statue 119.071.** No announcement or review of the bid documents shall be conducted at the public opening of the bids.

Based on the above, Manatee County will receive bids at the date and time stated, and will make public at the opening the names of the business entities of all that submitted an offer and any amount presented as a total offer without any verification of the mathematics or the completeness of the offer. Upon the expiration of the statutory term for exemption the actual documents may be inspected or copied. When County staff have completed a mathematic validation and inspected the completeness of the offers, tabulation shall be posted on [www.mymanatee.org](http://www.mymanatee.org).

**NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS:  
BASIS OF AWARD, TERMS AND CONDITIONS OF THE CONTRACT, OR  
SPECIFICATIONS, WHICH VARY FROM THE INFORMATION TO BIDDERS,  
SHALL HAVE PRECEDENCE**

**END OF SECTION "A"**

SECTION 00020  
**BASIS OF AWARD**

**B.01 BASIS OF AWARD**

Award shall be to the responsive, responsible bidder meeting specifications and having the lowest Total Bid Price for **Bid "A"**, or the lowest Total Bid Price for **Bid "B"**, for the requirements listed on the Bid Form for the Work as set forth in this Invitation For Bid. Bid Prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the Contract Documents to the County's satisfaction within the prescribed time.

**Two schedules for Completion of the Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "Total Bid Price". The County has the sole authority to select the bid based on the Completion Time which is in the best interest of the County. Only one award shall be made.**

In evaluating bids, the County shall consider the qualifications of the bidders; and if required, may also consider the qualifications of the subcontractors, suppliers, and other persons and organizations proposed. County may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more bids are equal with respect to price, quality and service, the bid received from a local business shall be given preference in award. Whenever two or more bids which are equal with respect to price, quality and service are received, and neither of these bids are received from a local business, the award shall be determined by a chance drawing conducted by the Purchasing Office and open to the public.

Local business is defined as a business duly licensed and authorized to engage in the sale of goods and/or services to be procured, which has a place of business in Manatee County with full time employees at that location.

**B.02 SUBCONTRACTORS**

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility of the County for the proper completion of all Work to be executed under this contract.

The employment of unauthorized aliens by any vendor is considered a violation of Section 274 (e) of the Immigration and Employment Act. If the vendor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of this agreement.

**B.03 QUALIFICATIONS OF BIDDERS**

Each bidder must secure all licenses required (in accordance with Chapter 489 Florida Statutes) for the Work which is the subject of this bid; and, upon request, shall submit a true copy of all applicable licenses. The License requirement for this project is: **General Contractor.**

**Contractor shall have a minimum of three (3) years experience.**

**Bidders Note: FDOT shall review and approve the Contractor prior to any award.**

To demonstrate qualifications to perform the Work, each bidder must be prepared to submit within five days of County's request; written evidence such as financial data, previous experience, present commitments and other such data as may be requested. Bidder must be able to provide evidence of Bidder's qualification to do business in the state of Florida. Each bidder shall submit as a portion of their bid, a completed Contractor's Questionnaire included as Section 00430.

A complete list of all subcontractors proposed for any portion of the Work may be requested of any Bidder deemed necessary by the County. Subcontracts shall be awarded only to those subcontractors considered satisfactory by the County.

**B.04 INSPECTION OF SITE**

**Prior to submission of a bid, each bidder shall visit the site to become familiar with all conditions that may affect services that are required to completely execute the full intent of these specifications. Site visit shall be acknowledged in Section 00300, Bid Form, page 00300-1.**

**B.05 PREPARATION OF CONTRACT**

A written notice confirming award or recommendation thereof will be forwarded to the Successful Bidder accompanied by the required number of unsigned counterparts of the Agreement. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement with any other required documents to County. (Note: Contract must be approved in accordance with the Manatee County Code of Laws, Chapter 2-26, Manatee County Purchasing Ordinance and the Standards and Procedures approved by the County Administrator).

**END OF SECTION "B"**

SECTION 00030  
**GENERAL TERMS AND CONDITIONS OF THE CONTRACT**

**C.01 CONTRACT FORMS**

The agreement resulting from the acceptance of a bid shall be in the form of the agreement stated in this bid.

**C.02 ASSIGNMENT OF CONTRACT**

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due there under to any other person, firm or corporation unless first obtaining the written consent of the County. The giving of such consent to a particular subcontractor assignment shall not dispense with the necessity of such consent to any further or other assignment.

**C.03 COMPLETION OF WORK**

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract Time commences to run. Two bids shall be considered based on **Bid "A" 300 calendar days** and **Bid "B" based on 270 calendar days**. The County has the sole authority to select the bid based on the Completion Time which is in the best interest of the County. Only one award shall be made.

**C.04 LIQUIDATED DAMAGES**

If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will hinder its completion within the time specified, the County may seek damages. The actual damages for delay will be impossible to determine and in lieu thereof, the Contractor shall pay to the County the sum of **\$1,423.00** as fixed, agreed, and liquidated damages for each calendar day of the delay until the Work is finally accepted by the County and the Contractor and his Surety shall be liable for the amount thereof.

**C.05 PAYMENT**

Contractor may apply for partial payment on monthly estimates, based on the amount of Work done or completed in compliance with the provisions of the Contract. Contractor shall submit an application, on a form provided or approved by the County, of an approximate estimate of the proportionate value of the Work done, items and locations of the Work performed up to and including the last day of the period then ending. The County will then review said estimate and make any necessary revisions so that the estimate can receive approval for payment. If the Contractor and the County do not agree on the approximate estimate of the proportionate value of the Work done for any pay period, the determination of the County will be binding. The amount of said estimate after deducting any required retainage and all previous payments shall be due and payable to the Contractor within 25 days after the pay estimate has been approved by the County. It is the Contractor's responsibility for the care of the materials.

C.05 PAYMENT (Continued)

Any damage to or loss of said materials is the full responsibility of the Contractor. Any Periodical Pay Estimate signed by the Contractor shall be final as to the Contractor for any or all work covered by the Periodical Pay Estimate. Any requests for payment of materials stored on site must be accompanied with a paid receipt. The 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 the County at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter referred to as "Liens").

The Contractor agrees to furnish an affidavit stating that all laborers, material men, and subcontractors have been paid on the project for Work covered by the application for payment and that a partial or complete release of lien, as may be necessary, be properly executed by the material men, laborers, subcontractors on the project for Work covered by the application for payment, sufficient to secure the County from any claim whatsoever arising out of the aforesaid Work.

When the Contractor has completed the Work in compliance with the terms of the Contract Documents, he shall notify the County in writing that the project is ready for final inspection. The County will then advise the Contractor as to the arrangements for final inspection and what Work, if any, is required to prepare the project or a portion thereof for final inspection. When the County determines the project or portion thereof is ready for final inspection, the County shall perform same. Upon completion of final inspection, the County will notify Contractor of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies. When all such errors have been corrected, a final re-inspection will be made. The process will be repeated until, in the opinion of the County, the project has been completed in compliance with the terms of the Contract Documents.

When final acceptance has been made by the County, the County will make final payment of the Contract amount, plus all approved additions, less approved deductions and previous payments made. The Contract will be considered complete when all work has been finished, the final inspection made, approved as-builts received, and the project finally accepted in writing by the County. The Contractor's responsibility shall then terminate except as otherwise stated.

C.06 RETAINAGE

A **retainage** of 2.5% of the total contract amount shall be withheld from payments after 75% completion of the Work. Upon substantial completion, this retainage shall be reduced to 1% of the total contract amount plus such amount as the County may reasonably deem necessary to repair, replace, complete or correct any damaged, defective, incorrect or incomplete work. Upon final acceptance, the remaining retainage shall be included in the final payment.

**C.07 WARRANTY AND GUARANTEE PROVISIONS**

All work, materials, and equipment furnished as defined herein shall be guaranteed and warranted by the contractor for a minimum period of three (3) years, unless otherwise specified, from final acceptance by the County to be free from defects due either to faulty materials or equipment or faulty workmanship.

All materials, equipment, and workmanship furnished and installed by the contractor is warranted and guaranteed by the contractor to be such as to meet the required standards and to accomplish the purpose and function of the project as defined, detailed, and specified herein.

The County shall, following discovery thereof, promptly give written notice to the contractor of faulty materials, equipment, or workmanship within the period of the guarantee and the contractor shall promptly replace any part of the faulty equipment, material, or workmanship at his own cost. These warranty and guarantee provisions create no limitations on the County as to any claims or actions for breach of guaranty or breach of warranty that the County might have against parties other than the contractor, and do not constitute exclusive remedies of the County against the contractor.

**C.08 ROYALTIES AND PATENTS**

The contractor shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Contractor shall defend all suits or claims for infringement of any patent, trademark or copyright, and shall save the County harmless from loss on account thereof, including costs and attorney's fees.

**C.09 AUTHORIZED PRODUCT REPRESENTATION**

The contractor, by virtue of submitting the name and specifications of a manufacturer's product, will be required to furnish the named manufacturer's product. Failure to perform accordingly may, in the County's sole discretion, be deemed a breach of contract, and shall constitute grounds for the County's immediate termination of the contract.

**C.10 REGULATIONS**

It shall be the responsibility of the bidder to assure compliance with any OSHA, EPA and/or other federal or state of Florida rules, regulations or other requirements, as each may apply.

**C.11 CANCELLATION**

Any failure of the contractor to furnish or perform the Work (including, but not limited to, commencement of the Work, failure to supply sufficient skilled workers or suitable materials or equipment) in accordance with the contract, the County may order the stop of the Work, or any portion thereof, until the cause for such order has been eliminated. If the contractor persistently fails to perform the Work in accordance with the contract, the County reserves the right to terminate the contract and select the next qualified bidder or re-advertise this procurement in part or in whole. The County reserves the right to cancel all or any undelivered or unexecuted portion of this contract with or without cause.

**C.12 INDEMNIFICATION**

The contractor covenants and agrees to indemnify and save harmless the County, its agents and employees, from and against all claims, suits, actions, damages, causes of action, or judgments arising out of the terms of the resulting agreement for any personal injury, loss of life, or damage to the property sustained as a result of the performance or non-performance of services or delivery of goods; from and against any orders, judgments, or decrees, which may be entered against the County, its agents or employees; and from and against all costs, attorney's fees, expenses and other liabilities incurred in the defense of any such claim, suit or action, and the investigation thereof. Nothing in the award, resulting agreement, contract or Purchase Order shall be deemed to affect the rights, privileges and immunities of the County as set forth in Florida Statute Section 768.28.

**C.13 MANUALS, SCHEMATICS, HANDBOOKS**

All manuals, schematics and handbooks shall be provided which are applicable to the equipment delivered. An operators manual, parts manual and technician manual must also be provided. Parts lists (manuals) must include OEM part numbers for items not manufactured by the bidder. Vendor shall furnish two (2) copies of each.

**C.14 INSURANCE**

The contractor will not commence work under a contract until all insurance under this section and such insurance coverage as might be required by the County has been obtained. The contractor shall obtain, and submit to Purchasing within 10 calendar days of request, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

a. Workers' Compensation/Employers' Liability

Part One - There shall be no maximum limit (other than as limited by the applicable statute) for liability imposed by Florida Workers' Compensation Act or any other coverage required by the contract documents which are customarily insured under Part One of the standard Workers' Compensation Policy.

**C.14 INSURANCE (Continued)**

Part Two - The minimum amount of coverage required by the contract documents which are customarily insured under Part Two of the standard Workers' Compensation Policy shall be:

<u>\$100,000</u>	(Each Accident)
<u>\$500,000</u>	(Disease-Policy Limit)
<u>\$100,000</u>	(Disease-Each Employee)

b. Commercial General Liability

The limits are to be applicable only to work performed under this contract and shall be those that would be provided with the attachment of the Amendment of Limits of Insurance (Designated Project or Premises) endorsement (ISO Form CG 25 03) a Commercial General Liability Policy with the following minimum limits.

General Aggregate:	
Products/Completed Operations Aggregate	<u>\$1,000,000</u>
Personal and Advertising Injury	<u>\$300,000</u>
Each Occurrence	<u>\$300,000</u>
Fire Damage (Any One Fire)	<u>\$Nil</u>
Medical Expense (Any One Person)	<u>\$Nil</u>

c. Business Auto Policy

Each Occurrence Bodily Injury and	
Property Damage Liability Combined	<u>\$300,000</u>
Annual Aggregate (if applicable):	<u>\$1,000,000</u>

d. Owners Protective Liability Coverage

The minimum OPC Policy limits per occurrence and, if subject to an aggregate, annual aggregate to be provided by the contractor shall be the same as the amounts shown above as the minimum per occurrence and general policy aggregate limits respectively required for the Commercial General Liability coverage. The limits afforded by the OPC Policy and any excess policies shall apply only to the County and the County's officials, officers, agents and employees and only to claims arising out of or in connection with the work under this contract.

e. Property Insurance

**If this contract includes** construction of or additions to above ground buildings or structures, contractor shall provide "**Builder's Risk**" insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

**C.14 INSURANCE (Continued)****f. Installation Floater**

**If this contract does not include** construction of or additions to above ground building or structures, **but does involve** the installation of machinery or equipment, contractor shall provide an "**Installation Floater**" with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

**g. Certificates of Insurance and Copies of Policies**

Certificates of Insurance in triplicate evidencing the insurance coverage specified in the six above paragraphs a., b., c., d., e., and f., shall be filed with the Purchasing Director before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the bid number, project title and location of project. Insurance shall remain in force at least one year after completion and acceptance of the project by the County, in the amounts and types as stated herein, with coverage for all products and services completed under this contract.

**ADDITIONAL INSURED: The contractor shall name Manatee County as additional insured in each of the applicable policies.**

If the initial insurance expires prior to the completion of operations and/or services by the contractor, renewal certificates of insurance and required copies of policies shall be furnished by the contractor and delivered to the Purchasing Official thirty (30) days prior to the date of their expiration.

Nothing herein shall in any manner create any liability of the County in connection with any claim against the contractor for labor, services, or materials, or of subcontractors; and nothing herein shall limit the liability of the contractor or contractor's sureties to the County or to any workers, suppliers, material men or employees in relation to this contract.

**C.15 BID BOND/CERTIFIED CHECK**

By offering a submission to this Invitation For Bid, the bidder agrees should the bidder's bid be accepted, to execute the form of contract and present the same to Manatee County for approval within 10 days after being notified of the awarding of the contract. The bidder further agrees that failure to execute and deliver said form of contract **within 10 days** will result in damages to Manatee County and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed bid in the amount of five (5%) percent of the total amount of the bid.

**C.15 BID BOND/CERTIFIED CHECK (Continued)**

The bidder further agrees that in case the bidder fails to enter into a contract, as prescribed by Manatee County, the bid bond/certified check accompanying the bid shall be forfeited to Manatee County as agreed liquidated damages. If the County enters into a contract with a bidder, or if the County rejects any and/or all bids, accompanying bond will be promptly returned.

**C.16 PERFORMANCE AND PAYMENT BONDS**

The successful bidder shall furnish surety bonds as security for faithful performance of the contract awarded as a result of this bid, and for the payment of all persons performing labor and/or furnishing material in connection therewith. Surety of such bonds shall be in an amount equal to the bid award (100% each) and from a duly authorized and nationally recognized surety company, authorized to do business in Florida, satisfactory to this County. The attorney-in-fact who signs the bonds must file with the bonds a certificate and effective dated copy of power-of-attorney. (Reference Florida Statute 255.05)

Furnishing the performance and payment bonds shall be requisite to execution of a contract with the County. Said performance and payment bonds will remain in force for the duration of the contract with the premiums paid by the contractor. Failure of successful bidder to execute such contract and to supply the required bonds shall be just cause for annulment of the award.

The County may then contract with another acceptable bidder or re-advertise this Invitation For Bid. If another bidder is accepted, and notice given within 90 days after the opening of bids, this acceptance shall bind the bidder as though they were originally the successful bidder.

Failure of the County at any time, to require performance by the contractor of any provisions set out in the contract will in no way affect the right of the County, thereafter, to enforce the provisions. Bonds to remain in effect for one year after final payment becomes due.

**C.17 NO DAMAGES FOR DELAY**

No claim for damages or any claim other than for an extension of time shall be made or asserted against the County by reason of any delays. The Contractor shall not be entitled to an increase in the Total Contract Price or payment or compensation of any kind from the County or direct, indirect, consequential impact or other costs, expenses for damages, including but not limited to costs of acceleration or inefficiency arising because of delay, disruption, interference or hindrance from any

**C.17 NO DAMAGES FOR DELAY (Continued)**

cause whatsoever; provided, however, that this provision shall not preclude recovery or damages by the Contractor for hindrance or delays due solely to fraud, bad faith, or active interference on part of the County or its agents. Otherwise, the Contractor shall only be entitled to extensions of the Contract Time as the sole and exclusive remedy for such resulting delay, in accordance with and to the extent specifically provided above.

**C.18 NO INTEREST**

Any monies not paid by the County when claimed to be due to the Contractor under this Contract shall not be subject to interest including prejudgment interest. Any monies not paid by the County when claimed to be due to the Contractor for damages awarded in the case of construction delays shall not be subject to prejudgment interest.

**C.19 CONSTRUCTION OF CONTRACT**

This Contract and the rights and responsibilities hereunder shall not be construed more strongly against either party, regardless of the extent to which such party may have participated in the preparation hereof.

**C.20 BUILDING PERMITS**

Contractor shall secure the building permit for the County. Contractor shall secure and pay for other permits, governmental fees, and licenses necessary for the proper execution and completion of the Work, which are applicable at the time the bids are received. Fees to relocate utilities on County's property shall be included in the bid of the contractor doing the relocation. Contractor shall be responsible for contacting the local governing agency for such cost information and requirements.

**END OF SECTION "C"**

SECTION 00100  
**BID SUMMARY**

**D.01 THE WORK**

The Work in this contract consists of the construction of a Downtown Transit Station to be located in Bradenton, FL in accordance with the attached Specifications and Plans. Construction and record drawings shall fully meet the requirements of all current federal, state and county laws, rules, regulations and standards, with the most stringent applying.

Bidders shall comply with all Federal and State Guidelines for this procurement.

**PROJECT LOCATION: 601 13<sup>TH</sup> Street West, Bradenton, Manatee County, FL**

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. The Contractor shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety or life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents, whether specifically indicated in the Contract Documents or not.

The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and / or restoration required as a result of damages caused prior to acceptance by the Owner..

**D.02 SUBCONTRACTORS, SUPPLIERS AND OTHERS**

The identity of subcontractors, suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) may be requested by the County for each bid item from any of the Bidders; and the Bidder shall respond within five days after the date of such request. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such subcontractor, supplier, persons or organization if requested by County. If County, after due investigation, has reasonable objection to any proposed subcontractor, supplier, other person or organization, County may, before the Notice of Award is given, request the apparent successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time.

If apparent successful Bidder declines to make any such substitution, County may award the contract to the next lowest qualified Bidder that proposes to use acceptable subcontractors, suppliers, and other persons who County does not make written objection to. Contractor shall not be required to employ any subcontractor, supplier, other person or organization who Contractor has reasonable objection to.

**D.02 SUBCONTRACTORS, SUPPLIERS AND OTHERS(Continued)**

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility to the County for the proper completion of all Work to be executed under this contract.

**D.03 BIDS**

Bids are to be submitted in triplicate, one original and two copies, upon the County supplied forms. All blank spaces must be filled in as noted with amounts extended and totaled and no changes shall be made in the wording of the forms or in the items mentioned therein. In the event a change is made in your submittal, the Bidder shall write its initials by the change. Any bid may be rejected which contains any omissions, alterations, irregularities of any kind, or which shall in any manner fail to conform to bid requirements.

A bid made by an individual, either in his/her own or proper person or under a trade or firm name, shall be executed under the individual's signature. If made by a partnership, the bid shall be executed by two or more of the general partners. If made by a corporation, the bid shall be executed by its President or other legally authorized corporate officer or agent.

**D.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE**

It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Bid Documents thoroughly; (b) visit the site to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work; (c) consider federal, state, and local codes, laws, and regulations that may affect costs, progress, performance, or furnishing of the Work; (d) study and carefully correlate Bidder's observations with the Bid Documents; and (e) notify County of all conflicts, errors, or discrepancies in the Bid Document.

The accuracy of the existing utility locations shown on the plans is approximate and without express or implied warranty. Each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data which pertain to the physical conditions at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine his Bid for performing and furnishing the Work in accordance with the time price and other terms and conditions of the Contract Documents.

County will provide each Bidder access to the site to conduct such explorations and tests. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by Contractor in performing the Work identified in the Contract Documents.

**D.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE (Continued)**

All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by County unless otherwise provided in the Contract Documents.

**D.05 MATERIALS AND WORKMANSHIP**

All materials and apparatus required for this Work, except as specifically specified otherwise, shall be new, of first class quality, and shall be furnished, delivered, connected and finished in every detail. Construction shall be prescribed by good industry practice and in accordance with manufacturer's recommendations for the type being installed.

Use skilled workman trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.

**D.06 REGULATIONS AND MATERIAL DISPOSAL**

It shall be the responsibility of the contractor to assure compliance with any OSHA, EPA, federal, state, and/or local rules, regulations or other requirements as each may apply.

**D.07 DISCRETIONARY WORK**

This Bid Item entails minor increases (that may be directed by staff) to existing bid item quantities or minor modification items not bid which were unforeseen and necessary during the construction to provide a safe, complete project in accordance with Bid Documents. (This will not affect the requirement for change orders involving major modifications to the project.) Payment for all Work under this item shall be made only at the County's discretion in order to satisfactorily complete the project. In general, this item is for unanticipated conflicts and/or design changes required during construction which are necessary to complete the project without changing the initial scope of Work and without costly delays.

**END OF SECTION "D"**

**BID FORM – IFB #11-0579-OV  
SECTION 00300**

**For: Downtown Bradenton Transit Station, Manatee County, FL  
Location: 601 13<sup>th</sup> Street West, Bradenton, FL**

<b>TOTAL BID PRICE "A": \$ _____</b>
Based on a Completion Time of <b>300</b> calendar days
<b>TOTAL BID PRICE "B": \$ _____</b>
Based on a Completion Time of <b>270</b> calendar days

**Two schedules for Completion of the Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "Total Bid Price". The County has the sole authority to select the bid based on the Completion Time which is the best interest of the County. Only one award shall be made.**

We, the undersigned, hereby declare that we have carefully reviewed the bid documents, and with full knowledge and understanding of the aforementioned herewith submit this bid, meeting each and every specification, term, and condition contained in the Invitation for Bids.

We understand that the bid technical specifications, terms, and conditions in their entirety shall be made a part of any agreement or contract between Manatee County and the successful bidder. Failure to comply shall result in contract default, whereupon, the defaulting contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by the County.

**Communications concerning this Bid shall be addressed as follows:**

Person's Name: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Date: \_\_\_\_\_ FLContractorLicense# \_\_\_\_\_

Bidder is a WBE/MBE Vendor? \_\_\_\_\_ Certification \_\_\_\_\_

COMPANY'S NAME: \_\_\_\_\_

AUTHORIZED SIGNATURE(S): \_\_\_\_\_

Name and Title of Above Signer(s) \_\_\_\_\_

CO. MAILING ADDRESS: \_\_\_\_\_

STATE OF INCORPORATION \_\_\_\_\_ (if applicable)

TELEPHONE: ( ) \_\_\_\_\_ FAX: ( ) \_\_\_\_\_

Email address: \_\_\_\_\_

Acknowledge Addendum No. \_\_\_\_\_ Dated: \_\_\_\_\_ Acknowledge Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

**SIGN AND CONFIRM DATE OF PROJECT VISIT: \_\_\_\_\_ DATE: \_\_\_\_\_**

**BID FORM**

(Submit in Triplicate)  
SECTION 00300

**BID "A"**

**Downtown Bradenton Transit Station / 601 13th Street West Bradenton, Manatee County, FL**

Based on a Completion time of 300 Calendar Days

ITEM NO.	DESCRIPTION	EST. QTY.	U/M	UNIT PRICE	EXTENDED PRICE
1	Mobilization / Demobilization	1	LS	\$	\$
2	Temporary Erosion Control	1	LS	\$	\$
3	Site Work - complete	1	LS	\$	\$
4	Art Wall - Screen	1	LS	\$	\$
5	Landscape and Irrigation	1	LS	\$	\$
6	Building - complete	1	LS	\$	\$
7	Art Allowance	1	LS	\$160,000.00	\$160,000.00
8	Art Allowance Implementation and Associated Cost	1	LS	\$	\$
9	DISCRETIONARY WORK				\$100,000.00
	<b>TOTAL PRICE Bid "A" - Based on Completion Time of <u>300</u> Calendar Days</b>				\$

**Downtown Bradenton Transit Station / 601 13th Street West, Bradenton, FL**

10	Removal of Hazardous Material	CY	1	\$	\$
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**Bidders: Bid No. 10:** Hazardous Material Removal: Price shall be provided to owner and shall NOT be a part of the total bid. This bid item is reserved to be used if any hazardous materials are discovered at the site and need to be mitigated in order to complete the Work per drawings and specifications (Reference Measurement, Payment and Completion in Specifications Section).

BIDDER: \_\_\_\_\_

AUTHORIZED  
SIGNATURE: \_\_\_\_\_

Bid "A"

00300-2

# BID FORM / SUBCONTRACTOR PERCENTAGE

(Submit in Triplicate)  
SECTION 00300

**BID "A"**

**Downtown Bradenton Transit Station / 601 13th Street West Bradenton,  
Manatee County, FL**

Based on a Completion time of 300 Calendar Days

ITEM NO.	DESCRIPTION	SUBCONTRACTOR		DESCRIPTION OF WORK BY SUBCONTRACTOR
		%	MBE/WBE	
1	Mobilization / Demobilization			
2	Temporary Erosion Control			
3	Site Work - complete			
4	Art Wall - Screen			
5	Landscape and Irrigation			
6	Building - complete			

This is a duplication of the bid items where the Bidder shall state the percentage of work (of each item listed) and a description of the work which shall be performed by a subcontractor.

	<b>Removal of Hazardous Material</b>		
<p><b>Bidders:</b> Hazardous Material Removal: Price shall be provided to owner and shall NOT be a part of the total bid. This bid item is reserved to be used if any hazardous materials are discovered at the site and need to be mitigated in order to complete the Work per drawings and specifications (Reference Measurement, Payment and Completion in Specifications Section).</p>			

BIDDER: \_\_\_\_\_

AUTHORIZED  
SIGNATURE: \_\_\_\_\_

Bid "A"

00300-3

**BID FORM**

(Submit in Triplicate)  
SECTION 00300

**BID "B"**

**Downtown Bradenton Transit Station / 601 13th Street West Bradenton, Manatee County, FL**

Based on a Completion time of 270 Calendar Days

ITEM NO.	DESCRIPTION	EST. QTY.	U/M	UNIT PRICE	EXTENDED PRICE
1	Mobilization / Demobilization	1	LS	\$	\$
2	Temporary Erosion Control	1	LS	\$	\$
3	Site Work - complete	1	LS	\$	\$
4	Art Wall - Screen	1	LS	\$	\$
5	Landscape and Irrigation	1	LS	\$	\$
6	Building - complete	1	LS	\$	\$
7	Art Allowance	1	LS	\$160,000.00	\$160,000.00
8	Art Allowance Implementation and Associated Cost	1	LS	\$	\$
9	DISCRETIONARY WORK				\$100,000.00
	<b>TOTAL PRICE Bid "B" - Based on Completion Time of <u>270</u> Calendar Days</b>				\$
<b>Downtown Bradenton Transit Station / 601 13th Street West, Bradenton, FL</b>					
10	Removal of Hazardous Material	CY	1	\$	\$

**Bidders: Bid No. 10:** Hazardous Material Removal: Price shall be provided to owner and shall NOT be a part of the total bid. This bid item is reserved to be used if any hazardous materials are discovered at the site and need to be mitigated in order to complete the Work per drawings and specifications (Reference Measurement, Payment and Completion in Specifications Section).

BIDDER: \_\_\_\_\_

AUTHORIZED SIGNATURE: \_\_\_\_\_

Bid "B"

00300-4

## BID FORM / SUBCONTRACTOR PERCENTAGE

(Submit in Triplicate)  
SECTION 00300

**BID "B"**

**Downtown Bradenton Transit Station / 601 13th Street West Bradenton,  
Manatee County, FL**

Based on a Completion time of 270 Calendar Days

ITEM NO.	DESCRIPTION	SUBCONTRACTOR		DESCRIPTION OF WORK BY SUBCONTRACTOR
		%	MBE/WBE	
1	Mobilization / Demobilization			
2	Temporary Erosion Control			
3	Site Work - complete			
4	Art Wall - Screen			
5	Landscape and Irrigation			
6	Building - complete			

This is a duplication of the bid items where the Bidder shall state the percentage of work (of each item listed) and a description of the work which shall be performed by a subcontractor.

	<b>Removal of Hazardous Material</b>			
<p><b>Bidders:</b> Hazardous Material Removal: Price shall be provided to owner and shall NOT be a part of the total bid. This bid item is reserved to be used if any hazardous materials are discovered at the site and need to be mitigated in order to complete the Work per drawings and specifications (Reference Measurement, Payment and Completion in Specifications Section).</p>				

BIDDER: \_\_\_\_\_

AUTHORIZED  
SIGNATURE: \_\_\_\_\_

Bid "B"

00300-5

**SWORN STATEMENT  
THE FLORIDA TRENCH SAFETY ACT**

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR BY AN OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This Sworn Statement is submitted with IFB No. #11-0579-OV
2. This Sworn Statement is submitted by \_\_\_\_\_  
whose business address is \_\_\_\_\_  
and, if applicable, its Federal Employer Identification Number (FEIN) is \_\_\_\_\_.  
If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement \_\_\_\_\_.
3. Name of individual signing this Sworn Statement is: \_\_\_\_\_,  
Whose relationship to the above entity is: \_\_\_\_\_.
4. The Trench Safety Standards that will be in effect during the construction of this project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.
5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless the Owner and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.
6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	\$ _____	_____
b. _____	_____	_____	\$ _____	_____
c. _____	_____	_____	\$ _____	_____
d. _____	_____	_____	\$ _____	_____

7. The undersigned intends to comply with these standards by instituting the following procedures:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

THE UNDERSIGNED, in submitting this Bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this project.

\_\_\_\_\_  
(AUTHORIZED SIGNATURE / TITLE)

SWORN to and subscribed before me this \_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.  
(impress official seal)

\_\_\_\_\_  
Notary Public, State of Florida  
My commission expires: \_\_\_\_\_

SECTION 00430  
**CONTRACTOR'S QUESTIONNAIRE**  
(Submit in Triplicate)

The Bidder warrants the truth and accuracy of all statements and answers herein contained.  
(Include additional sheets if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID.

1. LICENSE # and COMPANY'S NAME: \_\_\_\_\_  
CO. PHYSICAL ADDRESS: \_\_\_\_\_  
TELEPHONE NUMBER: (\_\_\_\_) \_\_\_\_\_ FAX (\_\_\_\_) \_\_\_\_\_  
EMAIL ADDRESS: \_\_\_\_\_

2. Bidding as an; individual \_\_\_a partnership\_\_\_ a corporation; \_\_\_a joint venture; \_\_\_

3. If a partnership: list names and addresses of partners; if a corporation: list names of officers, directors, shareholders, and state of incorporation; if joint venture: list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Your organization has been in business under this firm's name as a \_\_\_\_\_  
for how many years? \_\_\_\_\_

5. Describe and give the date and owner of the last three government projects you've completed which are similar in cost, type, size, and nature as the one proposed (for a public entity). Include contact name and phone number:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Have you ever been assessed liquidated damages under a contract during the past five (5) years? If so, state when, where (contact name, address, and phone number) and why.

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7. Have you ever failed to complete work awarded to you? If so, state when, where and provide Contact name, address, phone number and why?

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8. Have you ever been debarred or prohibited from bidding on a governmental entity's construction project? If yes, name the entity and describe the circumstances:

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9. Name three individuals, governmental entities, or corporations for which you have performed similar work and to which you refer. Include contact name and phone number:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

10. What specific steps have you taken to examine the physical conditions at or contiguous to the site, including but not limited to, the location of existing underground facilities? State date of site visit.

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11. What specific physical conditions, including, but not limited to, the location of existing underground facilities have you found which will, in any manner, affect cost, progress, performance, or finishing of the work?

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12. Will you subcontract any part of this Work? If so, describe which major portion(s):

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13. If any, list (with contract amount) WBE/MBE to be utilized:

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14. What equipment do you own to accomplish this Work?

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15. What equipment will you purchase/rent for the Work? (Specify which)

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16. Provide detail of your organization's initiative to meet the goal of encouraging and promoting environmentally preferable "green" products. **Reference Article A.21, "Be Green",** Section 00010 "Information To Bidders".

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17. List the following in connection with the Surety which is providing the Bond(s):

Surety's Name: \_\_\_\_\_

Surety's Address: \_\_\_\_\_

Name, address and phone number of Surety's resident agent for service of process in Florida:

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Phone: (\_\_\_\_\_) \_\_\_\_\_

Email: \_\_\_\_\_

SECTION 00491  
Drug Free Work Place Certification

SWORN STATEMENT PURSUANT TO SECTION 6-101 (7) (B),  
MANATEE COUNTY PURCHASING CODE

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners

by \_\_\_\_\_

[Print individual's name and title]

\_\_\_\_\_ for \_\_\_\_\_

Whose business address is

\_\_\_\_\_?

and (if applicable) its Federal Employer Identification Number (FEIN) is \_\_\_\_\_

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: \_\_\_\_\_)

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it will provide a drug free work place by:

(1) providing a written statement to each employee notifying such employee that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance as defined by . 893.02(4), Florida Statutes, as the same may be amended from time to time, in the person's or entity's work place is prohibited specifying the actions that will be taken against employees for violation of such prohibition. Such written statement shall inform employees about:

- (i) the dangers of drug abuse in the work place;
- (ii) the person's or entity's policy of maintaining a drug free environment at all its work places, including but not limited to all locations where employees perform any task relating to any portion of such contract, business transaction or grant;
- (iii) any available drug counseling, rehabilitation, and employee assistance programs; and
- (iv) the penalties that may be imposed upon employees for drug abuse violations.

2) Requiring the employee to sign a copy of such written statement to acknowledge his or her receipt of same and advice as to the specifics of such policy. Such person or entity shall retain the statements signed by its employees. Such person or entity shall also post in a prominent place at all of its work places a written statement of its policy containing the foregoing elements (i) through (iv).

(3) Notifying the employee in the statement required by subsection (1) that as a condition of employment the employee will:

- (i) abide by the terms of the statement; and
- (ii) notify the employer of any criminal drug statute conviction for a violation occurring in the work place no later than five (5) days after such a conviction.

(4) Notifying the County within ten (10) days after receiving notice under subsection (3) from an employee or otherwise receiving actual notice of such conviction.

(5) Imposing appropriate personnel action against such employee up to and including termination; or requiring such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

(6) Making a good faith effort to continue to maintain a drug free work place through implementation of sections (1) through (5) stated above.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT:

- (1) Such person or entity has made false certification.
- (2) Such person or entity violates such certification by failing to carry out the requirements of sections (1), (2), (3), (4), (5), or (6) or subsection 3-101 (7) (B); or
- (3) Such a number of employees of such person or entity have been convicted of violations occurring in the work place as to indicate that such person or entity has failed to make a good faith effort to provide a drug free work place as required by subsection 3-101(7) (B).

\_\_\_\_\_  
[Signature]

STATE OF FLORIDA  
COUNTY OF \_\_\_\_\_

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2010  
by \_\_\_\_\_.

Personally known \_\_\_\_\_ OR produced identification \_\_\_\_\_  
[Type of identification]

\_\_\_\_\_  
Notary Public Signature My commission expires \_\_\_\_\_

\_\_\_\_\_  
[Print, type or stamp Commissioned name of Notary Public]

**Signatory Requirement:** In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

**PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION**  
**SWORN STATEMENT PURSUANT TO ARTICLE 5,**  
**MANATEE COUNTY PURCHASING CODE**

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to the Manatee County Board of County Commissioners by  
\_\_\_\_\_ [print individual's name and title]

\_\_\_\_\_ for \_\_\_\_\_ [print name of entity submitting sworn statement]

Whose business is: \_\_\_\_\_

and (if applicable) its Federal Employer Identification Number (FEIN) is \_\_\_\_\_ If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: \_\_\_\_\_

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it has not:

(1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or

(2) been convicted of an agreement or collusion among bidders or prospective bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or

(3) been convicted of a violation of an environmental law that, in the sole opinion of the County's Purchasing Official, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or

(4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such and entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the

business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

Any person or entity, who claims that this Article is inapplicable to him/her's/it because a conviction or judgement has been reversed by a court of competent jurisdiction, shall prove the same with documentation satisfactory to the County's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with the County.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

\_\_\_\_\_  
[Signature]

STATE OF FLORIDA  
COUNTY OF \_\_\_\_\_

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2010 by \_\_\_\_\_.

Personally known \_\_\_\_\_ OR produced \_\_\_\_\_  
[Type of identification]

\_\_\_\_\_ My commission expires \_\_\_\_\_  
Notary Public Signature

\_\_\_\_\_  
[Print, type or stamp Commissioned name of Notary Public]

**Signatory Requirement** - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

SECTION 00500  
FORM OF AGREEMENT  
BETWEEN THE  
COUNTY OF MANATEE, FLORIDA  
AND THE CONTRACTOR AS IDENTIFIED BELOW  
ON THE BASIS OF A STIPULATED UNIT COST CONTRACT PRICE

THIS AGREEMENT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the state of Florida, hereinafter referred to as the "COUNTY" and \_\_\_\_\_, hereinafter referred to as the "CONTRACTOR," duly authorized to transact business in the state of Florida, with offices located at \_\_\_\_\_.

**Article 1. WORK**

CONTRACTOR shall furnish all labor, materials, supplies, and other items required to complete the Work for IFB No. IFB#11-0579-OV / Downtown Bradenton Transit Station, Bradenton, Manatee County, FL in strict accordance with Contract Documents and any duly authorized subsequent addenda thereto, all of which are made a part hereof.

**Article 2. ENGINEER**

The County of Manatee, Project Management Department, is responsible as the COUNTY and SCHENKEL SHULTZ ARCHITECTURE hereinafter referred to as "ENGINEER," designed this project and is responsible for technical/engineering reviews and decisions. The ENGINEER is a member of the COUNTY'S project management team which is collectively responsible in ensuring the Work is completed in accordance with the Contract Documents. All communications involving this project will be addressed to:

County of Manatee  
Property Management Department  
Attn: Mr. Howard Leyo, Project Manager  
IFB#11-0579-OV  
1112 Manatee Avenue West, Suite  
Bradenton, FL 34208  
Phone (941) 748-4501, Ext. 3052

Schenkel Shultz Architecture  
677 North Washington Blvd  
Suite 37  
Bradenton, FL 34208  
Phone: 941-952-5875

Where the terms ENGINEER and/or COUNTY are used in the Contract Documents, it shall mean the COUNTY'S project management team.

**Article 3. CONTRACTOR'S REPRESENTATIONS**

In order to induce COUNTY to enter into this Agreement, CONTRACTOR makes the following representations:

- 3.1 CONTRACTOR has familiarized itself with the nature and extent of the Bid Documents, Work, site, locality and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- 3.2 CONTRACTOR has studied carefully all drawings of the physical conditions upon which CONTRACTOR is entitled to rely.
- 3.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the physical conditions at or contiguous to the site or which otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Bid Documents; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.
- 3.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Bid Documents with respect to existing underground facilities at or contiguous to the site and assumes responsibility for the accurate location of said underground facilities. Any additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said underground facilities conducted by the CONTRACTOR will be done at the CONTRACTOR'S expense.

- 3.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Bid.
- 3.6 CONTRACTOR has given COUNTY written notice of all conflicts, errors or discrepancies that have been discovered in the Bid Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR.
- 3.7 CONTRACTOR shall schedule and perform the Work subject to COUNTY'S approval and shall hold COUNTY harmless from all liabilities incurred due to CONTRACTOR'S failure to coordinate with the COUNTY.

**Article 4. CONTRACT DOCUMENTS**

The Contract Documents which comprise the entire Agreement between COUNTY and CONTRACTOR concerning the Work consist of the following:

- 4.1 This Agreement and Bid Document IFB#11-0579-OV
- 4.2 Performance and/or other Bonds and Insurance Certificate(s)
- 4.3 Drawings (not attached)
- 4.4 Addenda numbers \_\_\_\_ to \_\_\_\_ inclusive.
- 4.5 CONTRACTOR'S Bid Form and any other information submitted by Contractor prior to Notice of Award.

- 4.6 The following which may be delivered or issued after the effective date of the Agreement and are not attached hereto: all written Change Orders and other documents amending, modifying, or supplementing the Contract Documents.
- 4.7 The documents listed in paragraphs above are attached to this Agreement (except as noted otherwise above). There are no Contract Documents other than those listed above in this Article 4.

**Article 5. MISCELLANEOUS**

- 5.1 Terms used in this Agreement are defined in Article 1 of the General Conditions.
- 5.2 No assignment by a party hereto of any rights under or interest in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law); and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignee from any duty or responsibility under the Contract Documents.
- 5.3 COUNTY and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

The OWNER will pay, and the CONTRACTOR will accept in full consideration for the performance of the Work (**IFB No. #11-0579-OV) Downtown Bradenton Transit Station, Bradenton, Manatee County, FL** subject to additions and deduction as provided therein, the sum of \_\_\_\_\_ Dollars and Cents (\$\_\_\_\_\_) for Bid “\_\_\_\_” based on Completion Time of \_\_\_\_\_ calendar days and the sum of **\$1,423.00** as liquidated damages for each calendar day of delay.

\_\_\_\_\_  
CONTRACTOR

BY: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Name and Title of Signer (printed)

Date: \_\_\_\_\_

MANATEE COUNTY GOVERNMENT

BY: \_\_\_\_\_ For the County  
Signature

R. C. "Rob" Cuthbert, C.P.M., CPPO, Purchasing Official  
Name and Title of Signer

Date: \_\_\_\_\_

**SECTION 00700**  
**GENERAL CONDITIONS**

**ARTICLE I - DEFINITIONS**

Whenever used in the Bid Documents, the following terms have the meaning indicated which are applicable to both the singular and plural thereof:

Addendum - Written or graphic instruments issued prior to the opening of bids which clarify or change the bidding documents or the contract documents.

Agreement - The written Agreement between County and Contractor covering the Work to be performed; other contract documents are attached to the Agreement and made a part thereof as provided therein.

Amendment - A written amendment of the contract documents, signed by County and Contractor on or after the effective date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly work related aspects of the contract documents.

Application for Payment - The form accepted by Project Representative which is to be used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the contract documents.

Award - Acceptance of the bid from the person, firm, or corporation which in the County's sole and absolute judgment will under all circumstances best serve the public interest. Award shall be made by a majority vote of a quorum of Manatee County Board of County Commissioners in open session; or by the Purchasing Official in accordance with Manatee County Code of Laws.

Bid - The offer of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bidder - One who submits a bid directly to the County, as distinct from a sub-bidder, who submits a bid to a Bidder.

Bidding Documents - Consists of the Invitation For Bid, which includes but is not limited to: the bid form, drawings, Contract Documents, terms and conditions, and the proposed contract documents (including all Addenda issued prior to receipt of bids); and becomes a part of the Agreement.

Bonds - Performance and payment bonds and other instruments of security.

Change Order - A document recommended by Project Representative which is signed by Contractor and County and authorizes an addition, deletion, or revision in the Work or an adjustment in the contract price or the contract time, issued on or after the effective date of the Agreement.

Compensable Delay - Any delay beyond the control and without the fault or negligence of the Contractor resulting from County-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by County.

Contract Documents - The Agreement, Addenda (which pertain to the contract documents), Contractor's bid (including documentation accompanying the bid and any post-bid documentation submitted prior to the Notice of Award), the bonds, the specifications and the drawings, together with all amendments, modifications and supplements issued on or after the effective date of the Agreement.

Contract Price - The monies payable by County to Contractor under the contract documents as stated in the Agreement.

Contract Time - The number of days or the date stated in the Notice to Proceed for the completion of the Work.

Contractor - The person, firm or corporation with whom County has entered into an Agreement.

County - Manatee County, Florida, Board of County Commissioners.

Days - All references to days are to be considered calendar days except as specified differently.

Defective - An adjective which when modifying the work refers to work that is unsatisfactory, faulty or deficient, or does not conform to the contract documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the contract documents, or has been damaged prior to Project Representative's recommendation of final payment (unless responsibility for the protection thereof has been assumed by County).

Discretionary - Payment for all work that shall be made only at the County's discretion in order to satisfactorily complete the project in accordance with the Plans and Specifications.

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 bidding and contract documents.

Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective (date of execution).

Excusable Delay - Any delay beyond the control and without the negligence of the Contractor, the County, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, fires, floods, freight embargoes, acts of government other than County, or epidemics. Labor disputes and above average rainfall shall give rise only to excusable delays.

Float or Slack Time - The time available in the progress schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

Inexcusable Delay - Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the Contractor.

Non-prejudicial Delay - Any delay impacting a portion of the Work within the available total float or slack time and not necessarily preventing completion of the Work within the contract time.

Notice of Award - The written notice to the successful bidder stating Award has been approved by the Board of County Commissioners; or by the Purchasing Official in accordance with Ordinance 09-52, Manatee County Purchasing Code.

Notice of Intent to Award - The written notice to the apparent low bidder stating Award has been recommended with final Award to be authorized by the Board of County Commissioners.

Notice to Proceed - Written notice by County (after execution of contract) to Contractor fixing the date on which the contract time will commence to run and on which Contractor shall start to perform (ten (10) days from date of such notice) Contractor's obligations under the contract documents.

Preconstruction Conference - Prior to starting the Work, a meeting scheduled by County with Contractor to review the Work schedules, to establish procedures for handling shop drawings and other submissions, for processing periodical pay estimates, and such other matters as may be pertinent to the project.

Prejudicial Delay - Any excusable or compensable delay impacting the Work and exceeding the total float available in the progress schedule, thus preventing completion of the Work within the contract time unless the Work is accelerated.

Pre-operation Testing - All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that individual components of the work have been properly constructed and do operate in accordance with the contract documents for their intended purposes.

Project - The total construction of which the Work to be provided under the contract documents may be the whole or a part as indicated elsewhere in the contract documents.

Project Representative - The authorized representative of County who is assigned to the project or any part thereof.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by Contractor to illustrate material or equipment for 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 and certain administrative details applicable thereto.

Subcontractor - An individual or corporation having a direct contact with Contractor or with any other subcontractor for the performance of a part of the Work at the site. Such person or firm has contractual relations with the Contractor, not with the County.

Substantial Completion - The Work (or a specified part thereof) has progressed to the point when, in the opinion of the Engineer as evidenced by Engineer's definitive certificate of Substantial Completion, it is sufficiently complete in accordance with contract documents so that the work can be utilized for the purposes for which it is intended; or if there be no such certificate issued, when final payment is due.

Successful Bidder - The lowest qualified, responsible and responsive bidder to whom an award is made.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman or vendor.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work - Work to be paid for on the basis of unit prices.

Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the contract documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the contract documents.

Work Directive Change - A written directive to contractor, issued on or after the effective date of the Agreement and signed by County and recommended by Project Representative ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or to emergencies. A work directive change may not change the contract price or the contract time; but is evidence that the parties expect that the change directed or documented by a work directive change will be incorporated in a subsequently issued change order following negotiations by the parties as to its effect, if any, on the contract price or contract time.

**ARTICLE 2 - PRELIMINARY MATTERS**

Computation of Time: When time is referred to in the contract documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

- 2.1 The Contractor must submit a proposed schedule of the Work at the preconstruction conference. The purpose of this schedule is to enable the County to govern the Work, to protect the functions of the local government and its citizens and to aid in providing appropriate surveillance. The County shall have the right to reschedule work provided such rescheduling is in accord with the remainder of terms of the contract. The schedule shall show, as a minimum, the approximate dates on which each segment of the work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The County, after necessary rescheduling and obtaining additional information for specific purposes, shall review and approve the schedule. The Contractor shall also forward to the County, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the work under the contract, in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the County's review and approval. In addition, more detailed schedules may be required by the County for daily traffic control.
- 2.2 A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. The contract time will commence at the time specified in such notice. Contractor shall start to perform the Work on the date specified in the notice to proceed, but no work shall be done at the site prior to the date on which the contract time commences to run.
- 2.3 If at any time the materials and appliances to be used appear to the County as insufficient or improper for securing the quality of work required or the required rate of progress, the County may order the Contractor to increase his efficiency or to improve the character of his work and the Contractor shall conform to such an order. The failure of the County to demand any increase of such efficiency of any improvement shall not release the County from his obligation to secure the quality of work or the rate of progress necessary to complete the Work within the limits imposed by the contract. The County may require the Contractor to remove from the Work such employees as the County deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Work is deemed to be contrary to the County's interest.
- 2.4 The County reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of their Work, and promptly connect and coordinate the Work with theirs.

### ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, RE-USE

- 3.1 The contract documents comprise the entire Agreement between County and Contractor concerning the work. The contract documents are complementary; what is called for by one is as binding as if called for by all. The contract documents will be construed in accordance with the laws and ordinances of the State of Florida and the County of Manatee.

Should a conflict exist within the contract documents, the precedence in ascending order of authority are as follows: 1) Standard Printed Contract Documents, 2) Special Conditions, 3) General Conditions and 4) Drawings. Note: Computed dimensions shall govern over scaled dimensions.

- 3.2 It is the intent of the contract documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the contract documents. Any work, materials or equipment that may reasonably be inferred from the contract documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the contract documents) shall be effective to change the duties and responsibilities of County, Contractor or Engineer, or any of their agents or employees from those set forth in the Contract Documents.

- 3.3 The contract documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

- 3.3.1 A Formal Written Amendment
- 3.3.2 A Change Order
- 3.3.3 Administrative Contract Adjustment (ACA)

- 3.4 In addition, the requirements of the contract documents may be supplemented and minor variations and deviations in the Work may be authorized in one or more of the following ways:

- 3.4.1 Discretionary Work – Field Directive
- 3.4.2 Engineer's approval of a Shop Drawing or sample.

## ARTICLE 4 - CONTRACTOR'S RESPONSIBILITIES

- 4.1 Contractor shall keep on the Work at all times during its progress a competent resident superintendent; who shall be the 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.
- 4.2 Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the contract documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto and except as otherwise indicated in the contract documents, all Work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of work on Saturday, Sunday or legal holiday without County's written consent given after prior notice to Engineer (at least 72 hours in advance).
- 4.2.1 Contractor shall pay for all additional engineering charges to the County for any overtime work which may be authorized. Such additional engineering charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by County on account of such overtime work. At County's option, overtime costs may be deducted from Contractor's monthly payment request or Contractor's retainage prior to release of final payment.
- 4.3 Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.
- 4.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the contract documents. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable supplier except as otherwise provided in the contract documents.
- 4.5 Contractor shall be fully responsible to County for all acts and omissions of the subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between County or Engineer and any such subcontractor, supplier or other person or organization, nor shall it create any obligation on the part of County to pay or to see to the payment of any monies due any such subcontractor, supplier or other person or organization.

- 4.6 **Permits:** Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. County shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work.
- 4.7 During the progress of the Work, Contractor shall keep the premises free from accumulation of waste materials rubbish and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials and shall leave the site clean and ready for occupancy by County. Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents.
- 4.8 Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.
- 4.9 **Safety and Protection:** Contractor shall comply with the Florida Department of Commerce Safety Regulations and any local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:
- 4.9.1 all employees on the work and other persons and organizations who may be affected thereby;
  - 4.9.2 all the work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
  - 4.9.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic way for the public and preservation of the County's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.

- 4.10 **Emergencies:** In emergencies affecting the safety or protection of persons or the work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or County, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give County prompt written notice if Contractor believes that any significant changes in the work or variations from the contract documents have been caused thereby. If County determines that a change in the contract documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.
- 4.11 For substitutes not included with the bid, but submitted after the effective date of the Agreement, Contractor shall make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provisions of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by the Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed substitute. In rendering a decision, County/Engineer and Contractor shall have access to any available float time in the construction schedule. In the event that substitute materials or equipment not included as part of the bid, but proposed after the effective date of the agreement, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the County and an appropriate change order executed.
- 4.11.1 If a specific means, method, technique, sequence of procedure of construction is indicated in or required by the contract documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the contract documents.
- 4.11.2 Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability and no substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a change order or an approved shop drawing. County may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- 4.11.3 Contractor shall reimburse County for the charges of Engineer and Engineer's Consultants for evaluating each proposed substitute submitted after the effective date of the Agreement and all costs resulting from any delays in the work while the substitute was undergoing review.

- 4.12 The Contractor shall furnish, free of charge, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the construction work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the project or parts of the project critical are involved, the Contractor will employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the work. The Contractor will be held responsible for the preservation of all stakes, marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they will be immediately and accurately replaced by the Contractor.
- 4.13 The Contractor has, by careful examination, satisfied himself as to the nature and location of the work and all other matters which can in any way affect the work under this contract, including, but not limited to details pertaining to boring, as shown on the drawings, are not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the work, approximately at the locations indicated. The Contractor shall examine boring data, where available, and make his own interpretation of the subsoil investigations and other preliminary data, and shall base his bid on his own opinion of the conditions likely to be encountered. In no event shall an extension of time be considered for any conditions that existed at the time of bidding, nor shall the Contractor receive extra compensation for completion of the project as intended by the drawings and in keeping with the contact documents. No verbal agreement or conversation with any officer, agent or employee of the County, before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.
- 4.14 If the Contractor, in the course of the work, finds that the drawings and/or Contract Documents cannot be followed, he shall immediately inform the County in writing, and the County shall promptly check the accuracy of the information. Any work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's risk.

#### ARTICLE 5 - OWNER'S RESPONSIBILITIES

- 5.1 County shall furnish the data required of County under the contract documents promptly and shall make payments to the Contractor within a reasonable time (no more than 45 days) after the Work has been accepted by the County. The form of all submittals, notices, change orders and other documents permitted or required to be used or transmitted under the contract documents shall be determined by the County/Engineer. Standard County forms shall be utilized.
- 5.2 The County shall provide the lands upon which the Work under this contract is to be done, except that the Contractor shall provide all necessary additional land required for the erection of temporary construction facilities and storage of his materials, together with right of access to same.

7.3 The value of any Work covered by a change order or of any claim for an increase or decrease in the contract price shall be determined in one of the following ways (at County's discretion):

7.3.1 Where the Work involved is covered by unit prices contained in the contract documents, cost will be determined by application of such unit prices to the quantities of the items involved.

7.3.2 By mutual acceptance of lump sum.

7.3.3 On the basis of the cost of the Work, plus a 20% Contractor's fee for overhead and profit. (Contractor shall submit an itemized cost breakdown together with supporting data.)

7.4 Either County or Contractor may make a claim for an adjustment in the contract price. The unit price of an item of unit price Work shall be subject to re-evaluation and adjustment under the following conditions:

7.4.1 If the total cost of a particular item of unit price Work amounts to 5% or more of the contract price and the variation in the quantity of the particular item of unit price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and

7.4.2 If there is no corresponding adjustment with respect to any other item of Work; and

7.4.3 If a Contractor believes that it has incurred additional expense as a result thereof; or

7.4.4 If County believes that the quantity variation entitles it to an adjustment in the unit price; or

7.4.5 If the parties are unable to agree as to the effect of any such variations in the quantity of unit price Work performed.

#### ARTICLE 8 - CHANGE OF CONTRACT TIME

8.1 Contract time may only be changed by a change order or a written amendment. Any claim for an extension or shortening of the contract time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

- 5.3 The County shall have the right to take possession of and use any completed portions of the work, although the time for completing the entire work or such portions may not have expired, but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

#### ARTICLE 6 - CHANGES IN THE WORK

- 6.1 Without invalidating the Agreement and without notice to any surety, County may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a written amendment, a change order, or a work directive change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the contract documents (except as otherwise specifically provided).
- 6.2 Contractor shall not be entitled to an increase in the contract price or an extension of the contract time with respect to any Work performed that is not required by the contract documents as amended, modified and supplemented.
- 6.3 County and Contractor shall execute appropriate change orders (or written amendments) covering changes in the Work which are ordered by County, or which may be required because of acceptance of defective Work.
- 6.4 At any time Engineer may request a quotation from Contractor for a proposed change in the Work and within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the contract price or contract time for the proposed change. Engineer shall have 21 calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in sufficient detail to reasonably permit an analysis by Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the request for quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

#### ARTICLE 7 - CHANGE OF CONTRACT PRICE

- 7.1 The contract price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the contract price.
- 7.2 The contract price may only be changed by change order or by a written amendment. Any claim for an increase or decrease in the contract price shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within ten (10) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event.

- 8.2 The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.
- 8.3 All time limits stated in the contract documents are of the essence.

#### ARTICLE 9 - WARRANTY, TEST/INSPECTION, CORRECTION

- 9.1 Contractor warrants (for a minimum period of three years or as otherwise stated herein) and guarantees to County that all work will be in accordance with the contract documents and will not be defective; that County, representatives of County, governmental agencies with jurisdictional interests will have access to the work at reasonable time for their observation, inspecting and testing (Contractor shall give Engineer timely notice of readiness of the work for all required approvals and shall assume full responsibility, including costs, in obtaining required tests, inspections, and approval certifications and/or acceptance, unless otherwise stated by County).
- 9.2 If any work (including work of others) that is to be inspected, tested, or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice. Neither observations by Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the work in accordance with the contract documents.
- 9.3 If the work is defective, or Contractor fails to supply sufficient skilled workers, or suitable materials or equipment, or fails to furnish or perform the work in such a way that the completed work will conform to the contract documents, County may order Contractor to stop the work, or any portion thereof and terminate payments to the Contractor until the cause for such order has been eliminated. Contractor shall bear all direct, indirect and consequential costs for satisfactory reconstruction or removal and replacement with non-defective work, including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and any additional expenses experienced by County due to delays to other Contractors performing additional work and an appropriate deductive change order shall be issued. Contractor shall further bear the responsibility for maintaining schedule and shall not be entitled to an extension of the contract time and the recovery of delay damages due to correcting or removing defective work.
- 9.3.1 If Contractor fails within seven (7) days after written notice to correct defective work, or fails to perform the work in accordance with the contract documents, or fails to comply with any other provision of the contract documents, County may correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, County may exclude Contractor from all or part of the site, take possession of all or part of the work, Contractor's tools, construction equipment and machinery at the site or for which County has paid

Contractor but which are stored elsewhere. All direct, indirect and consequential costs of County in exercising such rights and remedies will be charged against Contractor in an amount approved as to reasonableness by Engineer and a change order will be issued incorporating the necessary revisions.

- 9.3.2 If within three years after the date of completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the contract documents, any work is found to be defective, Contractor shall promptly, without cost to County and in accordance with County's written instructions, either correct such defective work or if it has been rejected by County, remove it from the site and replace it with non-defective work. If Contractor does not promptly comply with the terms of such instruction, County may have the defective work corrected/removed and all direct, indirect and consequential costs of such removal and replacement will be paid by Contractor.

#### ARTICLE 10 - SUSPENSION/TERMINATION OF WORK

- 10.1 County 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 written notice to Contractor, which will fix the date on which work will be resumed. Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore.
- 10.2 County may terminate the contract if Contractor commences a voluntary case under any chapter of the Bankruptcy Code or any similar action by filing a petition under any other federal or state law relating to the bankruptcy or insolvency; if a petition is filed against the Contractor under any chapter of the Bankruptcy Code or similar relief under any other federal or state law; if Contractor persistently fails to perform the work in accordance with the contract documents; if Contractor disregards laws or regulations of any public body having jurisdiction or the Engineer; or otherwise violates in any substantial way any provisions of the contract.
- 10.2.1 County may, after giving Contractor (and the surety, if there is one) seven (7) days written notice and to the extent permitted by laws and regulations, terminate the services of Contractor; exclude Contractor from the site and take possession of the work and of all Contractor's tools, construction equipment and machinery at the site and use the same to the full extent they could be used (without liability to Contractor for trespass or conversion); incorporate in the work all materials and equipment stored at the site or for which county has paid Contractor but which are stored elsewhere, and finish the work as County may deem expedient. In such case, Contractor shall not be entitled to receive any further payment beyond an amount equal to the value of material and equipment not incorporated in the work, but delivered and suitably stored, less the aggregate of payments previously made. If the direct and indirect costs of completing the work exceed the unpaid balance of the contract price, Contractor shall pay the difference to County. Such costs incurred by County shall be verified by County and incorporated in

a change order; but in finishing the work, County shall not be required to obtain the lowest figure for the work performed. Contractor's obligations to pay the difference between such costs and such unpaid balance shall survive termination of the Agreement.

- 10.3 If, through no act or fault of Contractor, the work is suspended for a period of more than ninety (90) days by County or under an order of court or other public authority, or Engineer fails to act on any application or fails to pay Contractor any sum finally determined to be due; then Contractor may, upon seven (7) days written notice to County terminate the Agreement and recover from County payment for all work executed, any expense sustained plus reasonable termination expenses. In lieu of terminating the Agreement, if Engineer has failed to act on any application of payment or County has failed to make any payment as aforesaid, Contractor may upon seven (7) days written notice to County stop the work until payment of all amounts then due.

#### ARTICLE 11 - CONTRACT CLAIMS

- 11.1 The rendering of a decision by Engineer with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by County or Contractor of such right or remedies as either may otherwise have under the contract documents or by laws or regulations in respect of any such claim, dispute or other matter. No action, either at law or at equity, shall be brought in connection with any such claim, dispute or other matter later than thirty (30) days after the date on which County/Engineer has rendered such written decision in respect thereof. Failure to bring an action within said thirty (30) day period shall result in Engineer's decision being final and binding on the Contractor. In no event may any such action be brought after the time at which instituting such proceedings would be otherwise barred by the applicable statute of limitations.
- 11.2 Before bringing any action in court pertaining to any claim, dispute or other matter in question(s) arising out of or relating to the contract documents or the breach thereof, or Engineer's final decision, except for claims which have been waived by the making and acceptance of final payment, the Contractor shall first submit written notice(s) of contract claims to the Purchasing Official for a decision; the Contractor may request a conference with the Purchasing Official. Claims include, without limitation, disputes arising under the contract and those based upon breach of contract, mistake, misrepresentation, or other cause for modification or revision. Contract claims shall use the process detailed in Section 2-26-63, Manatee County Purchase Code, Ordinance 09-52.

#### ARTICLE 12 - RESIDENT PROJECT REPRESENTATIVE - DUTIES, RESPONSIBILITIES

- 12.1 Resident Project Representative is Engineer/County's Agent, who will act as directed by and under the supervision of the Engineer, and who will confer with County/Engineer regarding his actions. Resident Project Representative's dealing in matters pertaining to the on-site work shall, in general, be only with the

County/Engineer and Contractor and dealings with subcontractors shall only be through or with the full knowledge of Contractor.

12.2 Resident Project Representative will:

- 12.2.1 Review the progress schedule, schedule of shop drawing submissions and schedule of values prepared by Contractor and consult with County/Engineer concerning their acceptability.
- 12.2.2 Attend preconstruction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with County/Engineer and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.
- 12.2.3 Serve as County/Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the contract documents. As requested by County/Engineer, assist in obtaining additional details or information when required at the job site for proper execution of the Work.
- 12.2.4 Receive and record date of receipt of shop drawings and samples, receive samples which are furnished at the site by Contractor and notify County/Engineer of their availability for examination.
- 12.2.5 Advise County/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 the County/Engineer.
- 12.2.6 Conduct on-site observations of the work in progress to assist County/Engineer in determining if the work is proceeding in accordance with the contract documents and that completed work will conform to the contract documents.
- 12.2.7 Report to County/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 or if work has been damaged prior to final payment; and advise County/Engineer when he believes work should be corrected or rejected or should be uncovered of observation or requires special testing, inspection or approval.
- 12.2.8 Verify that tests, equipment and system start-ups and operating and maintenance instructions are conducted as required by the contract documents and in the 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 start-ups.

- 12.2.9 Accompany visiting inspectors representing public or other agencies having jurisdiction over the project; record the outcome of these inspections and report to County/Engineer.
- 12.2.10 Transmit to Contractor, County/Engineer's clarifications and interpretations of the contract documents.
- 12.2.11 Consider and evaluate Contractor's suggestions or modifications in drawings or Contract Documents and report them with recommendations to County/Engineer.
- 12.2.12 Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and sample submissions, reproductions of original contract documents including all addenda, change orders, field orders, additional drawings issued subsequent to the execution of the contract, County/Engineer's clarifications and interpretations of the contract documents, progress reports and other project related documents.
- 12.2.13 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 or 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 County/Engineer.
- 12.2.14 Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.
- 12.2.15 Furnish County/Engineer periodic reports as required of progress of the work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions.
- 12.2.16 Consult with County/Engineer in advance of scheduling major tests, inspections or start of important phases of the work.
- 12.2.17 Report immediately the occurrence of any accident.
- 12.2.18 Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to County/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.
- 12.2.19 During the course of the work, verify that certificates, maintenance and operations manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed, and deliver this material to County/Engineer for his review prior to final acceptance of the work.

- 12.2.20 Before County/Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.
- 12.2.21 Conduct final inspection in the company of County/Engineer and Contractor and prepare a final list of items to be completed or corrected.
- 12.2.22 Verify that all items on final list have been completed or corrected and make recommendations to County/Engineer concerning acceptance.
- 12.3 Except upon written instructions of County/Engineer, Resident Project Representative;
  - 12.3.1 Shall not authorize any deviation from the contract documents or approve any substitute materials or equipment;
  - 12.3.2 Shall not exceed limitations on County/Engineer's authority as set forth in the contract documents;
  - 12.3.3 Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's Superintendent, or expedite the work;
  - 12.3.4 Shall not advise on 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;
  - 12.3.5 Shall not advise on or issue directions as to safety precautions and programs in connection with the work;
  - 12.3.6 Shall not authorize County to occupy the project in whole or in part; and
  - 12.3.7 Shall not participate in specialized field or laboratory tests.

ARTICLE 13 - APPRENTICES

- 13.1 In accordance with the requirement of Section 446.011, Florida Statutes, the following requirements to safeguard the welfare of apprentices and trainees shall be a part of this contract, if applicable.
  - 13.1.1 Contractor agrees to hire for the performance of the contract, a number of apprentices or trainees in each occupation which bears to the average number of the journeymen in that occupation to be employed in the performance of the contract, the ratio of at least one apprentice or trainee to every five journeymen.
  - 13.1.2 Contractor agrees, when feasible to assure that 25% of such apprentices or trainees are in their first year of training, except when the number of apprentices or trainees to be hired is fewer than four.

- 13.1.3 Contractor agrees to submit, at three month intervals, to the Bureau of Apprenticeship of the Division of Labor, records of employment by trade of the number of apprentices or trainees employed; race of all apprentices; the number of apprentices or trainees in their first year of training; and total hours of work of all apprentices, trainees, and journeymen.
- 13.1.4 Contractor agrees to submit to the Bureau of Apprenticeship of the Division of Labor, at three month intervals, a statement describing steps taken toward making a diligent effort in the hiring of apprentices and trainees and containing a breakdown by craft of hours worked and wages paid for first year apprentices or trainees, other apprentices or trainees and journeymen.

NOTE: The form of all submittals, notices, change orders and other documents permitted or required to be used or transmitted under the Contract shall be determined by the County. Standard County forms shall be utilized.

**END OF SECTION**

**FEDERAL TRANSIT ADMINISTRATION (FTA)  
CONTRACT CLAUSES**

**CONSTRUCTION SERVICES**

Revised: March, 2010  
Construction Services

# FEDERAL TRANSIT ADMINISTRATION CONTRACT CLAUSES

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# FEDERAL TRANSIT ADMINISTRATION (FTA) CONTRACT CLAUSES

## 1. FLY AMERICA REQUIREMENTS

49 U.S.C. § 40118  
41 CFR Part 301-10

**Applicable to:** *Contracts that have transportation of persons or property, by air, between a place in the U.S. and a place outside the U.S., or between places outside the U.S., when the FTA will participate in the costs of such air transportation.*

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

## 2. CARGO PREFERENCE REQUIREMENTS

46 U.S.C. 1241  
46 CFR Part 381

**Applicable to:** *All contracts involving equipment, materials, or commodities which may be transported by ocean vessels.*

**Use of United States-Flag Vessels.** The Contractor agrees:

(1) to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels.

(2) to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington D.C. 20590 and the FTA recipient (through the Contractor in the case of a subcontractor's bill-of-lading.)

(3) to include these requirements in all subcontracts issued pursuant to the contract when the subcontract may involve the transport of equipment, materials, or commodities by ocean vessel.

### **3. ENERGY CONSERVATION REQUIREMENTS**

42 U.S.C. 6321 et seq.  
49 CFR Part 18

***Applicable to:*** All contracts.

The Contractor agrees to 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.

### **4. FEDERAL CHANGES**

49 CFR Part 18

***Applicable to:*** All contracts.

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Agreement (Form FTA MA (14) dated October 2007) between City Utilities and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

### **5. NO GOVERNMENT OBLIGATION TO THIRD PARTIES**

***Applicable to:*** All contracts.

(1) City Utilities and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

### **6. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS**

31 U.S.C. 3801 et seq.  
49 CFR Part 31, 18 U.S.C. 1001  
49 U.S.C. 5307

***Applicable to:*** All contracts.

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq. and U.S. DOT regulations "Program Fraud Civil Remedies," 49 CFR Part 31, apply to its actions pertaining to this contract. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of

any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

## **7. TERMINATION**

49 U.S.C. Part 18  
FTA Circular 4220.1F

***Applicable to:*** All contracts in excess of \$10,000.

**(1) Termination for Convenience (General Provision):** City Utilities may terminate this contract, in whole or in part, at any time by written notice to the Contractor when it is in the City Utilities' best interest. The Contractor shall be paid its costs, including contract closeout costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to City Utilities to be paid the Contractor. If the Contractor has any property in its possession belonging to City Utilities, the Contractor will account for the same, and dispose of it in the manner City Utilities directs.

**(2) Termination for Default [Breach or Cause] (General Provision):** If the Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, City Utilities may terminate this contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract.

If it is later determined by City Utilities that the Contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of the Contractor, City Utilities, after setting up a new delivery of performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

**(3) Termination for Default (Construction):** If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract or any extension or fails to complete the work within this time, or if the Contractor fails to comply with any other provisions of this contract, City Utilities may terminate this contract for default. City Utilities shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. In this event, City Utilities may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to City Utilities resulting from the Contractor's refusal or failure to complete the work within specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by City Utilities in completing the work.

The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause if-

1. the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include: acts of God, acts of City Utilities, acts of another Contractor in the performance of a contract with City Utilities, epidemics, quarantine restrictions, strikes, freight embargoes; and

2. the contractor, within [10] days from the beginning of any delay, notifies City Utilities in writing of the causes of delay. If in the judgment of City Utilities, the delay is excusable, the time for completing the work shall be extended. The judgment of City Utilities shall be final and conclusive on the parties, but subject to appeal under the Disputes clauses.

If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of City Utilities.

**(4) Opportunity to Cure (General Provision):** City Utilities in its sole discretion may, in the case of a termination for breach or default, allow the Contractor [an appropriately short period of time] in which to cure the defect. In such case, the notice of termination will state the time period in which cure is permitted and other appropriate conditions

If Contractor fails to remedy to City Utilities' satisfaction the breach or default or any of the terms, covenants, or conditions of this Contract within [ten (10) days] after receipt by Contractor of written notice from City Utilities setting forth the nature of said breach or default, City Utilities shall have the right to terminate the Contract without any further obligation to Contractor. Any such termination for default shall not in any way operate to preclude City Utilities from also pursuing all available remedies against Contractor and its sureties for said breach or default.

**(5) Waiver of Remedies for any Breach:** In the event that City Utilities elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Contract, such waiver by City Utilities shall not limit City Utilities' remedies for any succeeding breach of that or of any other term, covenant, or condition of this Contract.

## **8. CIVIL RIGHTS REQUIREMENTS**

29 U.S.C. § 623, 42 U.S.C. § 2000  
42 U.S.C. § 6102, 42 U.S.C. § 12112  
42 U.S.C. § 12132, 49 U.S.C. § 5332  
29 CFR Part 1630, 41 CFR Parts 60 et seq.

**Applicable to:** *All contracts.*

### (1) Nondiscrimination

In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the American with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

### (2) Equal Employment Opportunity

#### (a) Race, Color, Creed, National Origin, Sex

In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (US DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 CFR Parts 60 et seq., (which implement Executive Order No. 11246 "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

#### (b) Age

In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. §§ 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities

In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act, " 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

## **9. DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS**

49 CFR Part 26

***Applicable to:*** All contracts.

(1) The Federal Fiscal Year Goal Has Been Set By City Utilities in an attempt to match projected procurements with available qualified disadvantaged businesses. City Utilities' goals for budgeted service contracts, bus parts, and other material and supplies for Disadvantaged Business Enterprises have been established by City Utilities as set forth by the Department of Transportation Regulations 49 CFR Part 26, and is considered pertinent to any contract resulting from this request for quotation/proposal.

If a specific DBE goal is assigned to this contract, it will be clearly stated in the bid documents, and if the contractor is found to have failed to exert sufficient, reasonable, and good faith efforts to involve DBEs in the work provided, City Utilities may declare the Contractor noncompliant and in breach of contract. If a goal is not stated in the bid documents, it will be understood that no specific goal is assigned to this contract.

(a) Policy – It is the policy of the Department of Transportation and City Utilities that Disadvantaged Business Enterprises (DBE), as defined in 49 CFR Part 26, have an equal opportunity to receive and participate in the performance of Contracts financed in whole or in part with federal funds under this Agreement. Consequently, the DBE requirements of 49 CFR Part 26, apply to this Contract. It is also the policy of City Utilities to:

- Ensure nondiscrimination in the award and administration of DOT-assisted contracts;
- Create a level playing field on which DBEs can compete fairly for DOT-assisted contracts;
- Ensure that the DBE Program is narrowly tailored in accordance with applicable law;
- Ensure that only firms that fully meet 49 CFR Part 26 eligibility standards are permitted to participate as DBEs; and
- Help remove barriers to the participation of DBEs in DOT-assisted contracts.

The Contractor agrees to ensure that DBEs as defined in 49 CFR Part 26, have the maximum opportunity to participate in whole or in part with federal funds provided under this Agreement.

In this regard, the Contractor shall take all necessary and reasonable steps in accordance with the regulations to ensure that DBEs have the maximum opportunity to compete for and perform subcontracts. The Contractor shall not discriminate on the basis of race, color, national origin, religion, sex, age or physical handicap in the award and performance of subcontracts.

It is further the policy of City Utilities to promote the development and increase the participation of businesses owned and controlled by disadvantaged. DBE involvement in all phases of City Utilities procurement activities are encouraged.

(b) DBE obligation – The Contractor and its subcontractors agree to ensure that DBEs have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under the Agreement. In that regard, all Contractors and subcontractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that DBEs have the maximum opportunity to compete for and perform contracts.

(c) Where the Contractor is found to have failed to exert sufficient reasonable and good faith efforts to involve DBEs in the work provided, City Utilities may declare the contractor noncompliant and in breach of contract. Guidance concerning good faith efforts may be found in the bid documents and are also listed in City Utilities' Disadvantaged Business Enterprise Program document.

(d) The Contractor will keep records and documents for a reasonable time following performance of this contract to indicate compliance with City Utilities' DBE program. These records and documents will be made available at reasonable times and places for inspection by any authorized representative of City Utilities and will be submitted to City Utilities upon request.

(e) City Utilities will provide affirmative assistance, as may be reasonable and necessary to assist the prime contractor in implementing their programs for DBE participation. The assistance may include the following upon request:

- Identification of qualified DBEs,
- Available listing of Minority Assistance Agencies,
- Holding bid conferences to emphasize requirements.

(2) Prime Contractors are encouraged to use the services of DBE banks.

(3) DBE Program Definitions:

(a) Disadvantaged business enterprise or DBE means a for-profit small business concern --

- i. That is at least 51 percent owned by one or individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or such individuals; and
- ii. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

(b) Small business concern means, with respect to firms seeking to participate as DBEs in DOT-assisted contracts, a small business concern as defined pursuant to section 3 of the Small Business Act and Small Business Administration regulations implementing it (12 CFR Part 121) that also does not exceed the cap on average annual gross receipts specified in §26.65(b).

- (c) Socially and economically disadvantaged individual means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is --
- (1) Any individual who a recipient finds to be a socially and economically disadvantaged individual on a case-by-case basis.
  - (2) Any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
    - i. "Black Americans", which includes persons having origins in any of the Black racial groups of Africa;
    - ii. "Hispanic Americans", which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
    - iii. "Native Americans", which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
    - iv. "Asian-Pacific American", which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of Pacific Islands (Republic of Palua), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kirbati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong;
    - v. "Subcontinent Asian Americans", which includes persons whose origins are from India, Pakistan, and Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
    - vi. Women;
    - vii. Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.

## 10. BUY AMERICA REQUIREMENTS

49 U.S.C. 5323(j)  
49 CFR Part 661

**Applicable to:** *Construction contracts and acquisition of goods or rolling stock (valued at more than \$100,000).*

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 CFR Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 CFR 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, microcomputer equipment, software, and small purchases (currently less than \$100,000) made with capital, operating, or planning funds. Separate requirements for rolling stock are set out at 5323(j)(2)(C) and 49 CFR 661.11. Rolling stock not subject to a general waiver must be manufactured in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification with all bids on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

**The certificate titled *Buy America Certification* must be completed and returned with your bid. This certificate is located behind the bid form.**

## **11. SEISMIC SAFETY REQUIREMENTS**

42 U.S.C. 7701 et seq. 49  
CFR Part 41

***Applicable to:*** Only to construction of new buildings or additions to existing buildings.

The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

## **12. CLEAN WATER REQUIREMENTS**

33 U.S.C. 1251

***Applicable to:*** All contracts and subcontracts which exceed \$100,000.

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

## **13. LOBBYING**

31 U.S.C. 1352  
49 CFR Part 19  
49 CFR Part 20

***Applicable to:*** Contracts for construction, architectural and engineering, acquisition of rolling stock, professional service contract, operational service contract, and turnkey contracts which exceed \$100,000.

**Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.]** - Contractors who apply or bid for an award of \$100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting

to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

**The certificate titled *Certification Regarding Lobbying* must be completed and returned with your bid. This certificate is located behind the bid form.**

#### **14. ACCESS TO RECORDS AND REPORTS**

49 U.S.C. 5325  
18 CFR 18.36 (i)  
49 CFR 633.17

***Applicable to:*** *Contracts as described below.*

(1) Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C. F. R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C. F. R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

(2) Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at \$100,000.

(3) Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. (If applicable)

(4) Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation

and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection. (If applicable)

(5) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

(6) The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

(7) FTA does not require the inclusion of these requirements in subcontracts.

### **15. CLEAN AIR**

42 U.S.C. 7401 et seq  
40 CFR 15.61  
49 CFR Part 18

**Applicable to:** *All contracts exceeding \$100,000.*

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

### **16. RECYCLED PRODUCTS**

42 U.S.C. 6962  
40 CFR Part 247  
Executive Order 12873

**Applicable to:** *The Recycled Products requirements apply to all contracts for items designated by the EPA, when the purchaser or contractor procures \$10,000 or more of one of these items during the fiscal year, or has procured \$10,000 or more of such items in the previous fiscal year, using Federal funds. These regulations apply to all procurement actions involving items designated by the EPA, where the procuring agency purchases \$10,000 or more of one of these items in a fiscal year, or when the cost of such items purchased during the previous fiscal year was \$10,000.*

The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

## 17. DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS

**Applicable to:** Construction contracts over \$2000 for Davis-Bacon Act.

**Applicable to:** Construction contracts over \$100,000 for Copeland Anti-Kickback Act.

### **Background and Application**

The Davis-Bacon and Copeland Acts are codified at 40 USC 3141, *et seq.* and 18 USC 874. The Acts apply to grantee construction contracts and subcontracts that "at least partly are financed by a loan or grant from the Federal Government." 40 USC 3145(a), 29 CFR 5.2(h), 49 CFR 18.36(i)(5). The Acts apply to any construction contract over \$2,000. 40 USC 3142(a), 29 CFR 5.5(a). 'Construction,' for purposes of the Acts, includes "actual construction, alteration and/or repair, including painting and decorating." 29 CFR 5.5(a). The requirements of both Acts are incorporated into a single clause (*see* 29 CFR 3.11) enumerated at 29 CFR 5.5(a) and reproduced below.

The clause language is drawn directly from 29 CFR 5.5(a) and any deviation from the model clause below should be coordinated with counsel to ensure the Acts' requirements are satisfied.

**(1) Minimum wages** - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be

classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

**(2) Withholding** - City Utilities shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, City Utilities may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**(3) Payrolls and basic records** - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to City Utilities for transmission to the Federal Transit Administration as requested. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

**(4) Apprentices and trainees** - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal

certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

**(5) Compliance with Copeland Act requirements** - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

**(6) Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**(7) Contract termination: debarment** - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**(8) Compliance with Davis-Bacon and Related Act requirements** - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

**(9) Disputes concerning labor standards** - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**(10) Certification of eligibility** - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a

person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

## 18. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

### **Background and Application**

The Contract Work Hours and Safety Standards Act is codified at 40 USC 3701, *et seq.* The Act applies to grantee contracts and subcontracts "financed at least in part by loans or grants from ... the [Federal] Government." 40 USC 3701(b)(1)(B)(iii) and (b)(2), 29 CFR 5.2(h), 49 CFR 18.36(i)(6). Although the original Act required its application in any construction contract over \$2,000 or non-construction contract to which the Act applied over \$2,500 (and language to that effect is still found in 49 CFR 18.36(i)(6)), the Act no longer applies to any "contract in an amount that is not greater than \$100,000." 40 USC 3701(b)(3) (A)(iii).

The Act applies to construction contracts and, in very limited circumstances, non-construction projects that employ "laborers or mechanics on a public work." These non-construction applications do not generally apply to transit procurements because transit procurements (to include rail cars and buses) are deemed "commercial items." 40 USC 3707, 41 USC 403 (12). A grantee that contemplates entering into a contract to procure a developmental or unique item should consult counsel to determine if the Act applies to that procurement and that additional language required by 29 CFR 5.5(c) must be added to the basic clause below.

The clause language is drawn directly from 29 CFR 5.5(b) and any deviation from the model clause below should be coordinated with counsel to ensure the Act's requirements are satisfied.

**(1) Overtime requirements** - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

**(2) Violation; liability for unpaid wages; liquidated damages** - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$ 10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

**(3) Withholding for unpaid wages and liquidated damages** - City Utilities shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

**(4) Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

## **19. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)**

49 CFR Part 29  
Executive Order 12549

**Applicable to:** All contracts and subcontracts which exceed \$25,000.

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by City Utilities. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to City Utilities, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

Contractors and subcontractors are also subject to a continuing duty of disclosure. Contractors and subcontractors must provide immediate written notice to City Utilities of Springfield if it learns that a person involved in a covered transaction has been excluded. City Utilities of Springfield must then provide written notice to the Federal Transit Administration.

## **20. BREACHES AND DISPUTE RESOLUTION**

49 CFR Part 18 FTA Circular 4220.1F

**Applicable to:** All contracts in excess of \$100,000.

See City Utilities' General Conditions which are made a part of this contract.

## **21. RIGHT OF PROTEST**

FTA Circular 4220.1F

**Applicable to:** All contracts

If a Contractor has a grievance with a solicitation or award, they may protest to the Manager-Purchasing within 14 days of award. The written protest shall include the name of the protestor, solicitation/contract number or description, and a statement of the grounds for protest. Protests should be filed with the Manager-Purchasing at the following address:

City Utilities of Springfield, Missouri  
Manager-Purchasing  
301 E. Central (65802)  
P.O. Box 551  
Springfield, MO 65801

Fax: (417) 831-8377

The Manager-Purchasing will investigate the complaint and decide whether the complaint is justified and if so, what corrective action should be taken. All decisions by the Manager-Purchasing are final.

The Federal Transit Administration will only entertain a protest that alleges City Utilities failed to follow the stated protest procedures. Such protests to FTA must be filed in accordance with FTA Circular 4220.1F.

## **22. BONDING REQUIREMENTS**

For Bonding requirements, refer to City Utilities' bonding requirements for bid guaranty and performance bond, including the required performance bond form, found in the contract bid documents.

## **23. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS**

FTA Circular 4220.1F

**Applicable to:** All contracts.

The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, dated November 1, 2008, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA

mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any City Utilities requests which would cause City Utilities to be in violation of the FTA terms and conditions.

## **24. COMPLIANCE WITH FEDERALLY REQUIRED CLAUSES AND REQUIREMENTS**

Contractor (bidder) is responsible for ensuring its compliance with all applicable Federal Transit Administration (FTA) requirements. Additionally, Contractor is responsible for ensuring that subcontractors, at as many tiers of the Project as required, perform in accordance with the terms, conditions and specifications of the contract, including all applicable FTA requirements.

Upon request of City Utilities or FTA, Contractor shall provide evidence of the steps it has taken to ensure its compliance with the FTA requirements, as well as evidence of the steps it has taken to ensure subcontractor performance, and/or submit evidence of subcontractor's compliance, at all tiers.

## **25. AMERICANS WITH DISABILITIES ACT (ADA)**

Americans with Disabilities Act (ADA). The Contractor agrees to comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA), as amended, 42 USC § 12101 et seq.; section 504 of the Rehabilitation Act of 1973, as amended, 29 USC § 794; 49 USC § 5301(d); and any implementing requirements FTA may issue. These regulations provide that no handicapped individual, solely by reason of his or her handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity included in or resulting from this Agreement.

## **26. PROMPT PAYMENT AND RETURN OF RETAINAGE**

*Applicable to: All contracts.*

The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 15 calendar days from the receipt of each payment the prime contractor receives from City Utilities. The prime contractor agrees further to return retainage payments to each subcontractor within 15 calendar days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of City Utilities. This clause applies to both DBE and non-DBE subcontractors.

It is the responsibility of the subcontractors to notify City Utilities' DBE Liaison Officer (John Penrose 417-831-8413) of prime contractor noncompliance with the above prompt payment provisions. Upon receipt of such notification, City Utilities will investigate and take appropriate action.

General Decision Number: FL100123 10/08/2010 FL123

Superseded General Decision Number: FL20080123

State: Florida

Construction Type: Building

County: Manatee County in Florida.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	03/12/2010
1	03/26/2010
2	04/02/2010
3	05/21/2010
4	07/23/2010
5	10/08/2010

ELEC0915-002 12/01/2009

	Rates	Fringes
<b>ELECTRICIAN</b>		
All building work other than Industrial Work which includes Telephone, Utility Companies, and Water Treatment Plants and also excludes Educational, Theme Park, Hospital Facilities, and all building work under \$200,000 or less.....	\$ 22.07	34%+\$0.22
Educational, Theme Park, Hospital Facilities, and all building work under \$200,000 or less, excluding Telephone, Utility Companies and Water Treatment plants.....	\$ 19.69	34%+\$0.22

\* ENGI0925-003 07/01/2010

	Rates	Fringes
<b>OPERATOR: Crane</b>		
Crawler Cranes; Truck Cranes; Pile Driver Cranes; Rough Terrain Cranes; and Any Crane not otherwise described below...	\$ 27.91	10.59
Hydraulic Cranes Rated 100 Tons or Above but Less Than 250 Tons; and Lattice Boom Cranes Less Than 150 Tons if not described below.	\$ 28.91	10.59

Lattice Boom Cranes Rated  
at 150 Tons or Above;  
Friction Cranes of Any  
Size; Mobile Tower Cranes  
or Luffing Boom Cranes of  
Any Size; Electric Tower  
Cranes; Hydraulic Cranes  
Rated at 250 Tons or  
Above; and Any Crane  
Equipped with 300 Foot or  
More of Any Boom  
Combination.....\$ 29.91                   10.59  
OPERATOR: Mechanic.....\$ 27.91                   10.59  
OPERATOR: Oiler.....\$ 21.38                   10.59  
OPERATOR: Boom Truck.....\$ 27.91                   10.59

IRON0397-001 07/01/2010

	Rates	Fringes
IRONWORKER, ORNAMENTAL, REINFORCING AND STRUCTURAL.....	\$ 26.67	11.16

PLUM0123-001 05/01/2010

	Rates	Fringes
PIPEFITTER (HVAC Pipe Installation Only).....	\$ 23.65	10.55

SHEE0015-002 07/01/2009

	Rates	Fringes
SHEETMETAL WORKER (HVAC Duct Installation Only).....	\$ 21.52	12.49

\* SUFL2009-020 05/22/2009

	Rates	Fringes
BRICKLAYER.....	\$ 18.95	0.00
CARPENTER, Includes Form Work....	\$ 15.89	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 13.05	1.49
INSULATOR - PIPE & PIPEWRAPPER...	\$ 13.13	3.03
LABORER: Asphalt Shoveler.....	\$ 7.88	0.00
LABORER: Common or General.....	\$ 9.42	0.00
LABORER: Concrete Saw.....	\$ 12.63	0.00
LABORER: Mason Tender - Brick...	\$ 13.00	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.83	1.90

LABORER: Pipelayer.....	\$ 12.31	1.19
LABORER: Roof Tearoff.....	\$ 8.44	0.00
LABORER: Landscape and Irrigation.....	\$ 12.00	0.00
OPERATOR: Asphalt Spreader.....	\$ 11.41	0.00
OPERATOR: Backhoe.....	\$ 11.00	0.00
OPERATOR: Blade/Grader.....	\$ 13.73	0.00
OPERATOR: Bulldozer.....	\$ 15.01	0.00
OPERATOR: Distributor.....	\$ 12.37	0.00
OPERATOR: Forklift.....	\$ 14.00	0.00
OPERATOR: Loader.....	\$ 13.80	1.79
OPERATOR: Paver.....	\$ 11.69	0.00
OPERATOR: Pump.....	\$ 19.00	0.00
OPERATOR: Roller.....	\$ 10.68	0.00
OPERATOR: Screed.....	\$ 11.34	0.00
OPERATOR: Tractor.....	\$ 9.91	0.00
OPERATOR: Trencher.....	\$ 11.75	0.00
PAINTER: Brush, Roller, and Spray.....	\$ 14.00	0.43
PIPEFITTER (Excluding HVAC Pipe Installation).....	\$ 17.83	0.00
PLUMBER.....	\$ 13.58	0.00
ROOFER (Metal Roofs Only).....	\$ 14.26	0.59
ROOFER, Including Built Up, Hot Tar, Modified Bitumen, Shake & Shingle, Single Ply and Slate & Tile (Excluding Metal Roof).....	\$ 14.00	0.43
SHEETMETAL WORKER (Excluding HVAC Duct Installation).....	\$ 18.79	3.21
TILE SETTER.....	\$ 14.61	0.00
TRUCK DRIVER: Dump Truck.....	\$ 10.00	0.00
TRUCK DRIVER: Lowboy Truck.....	\$ 12.09	0.00

-----  
WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

=====  
 Unlisted classifications needed for work not included within  
 the scope of the  
 classifications listed may be added after award only as  
 provided in the labor  
 standards contract clauses (29 CFR 5.5(a)(1)(ii)).

-----  
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In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

-----  
--

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
 Wage and Hour Division  
 U.S. Department of Labor  
 200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7).

Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

# Project Manual

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## **Downtown Bradenton Transit Station**

601 13<sup>th</sup> Street West

Manatee County, Florida

issued: November 12, 2010

commission no.: 0920818

## **100% Construction Documents**

### **Book 1 of 1**

- Divisions 00 thru 33

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**SCHENKELSHULTZ**  
□ □ □ A R C H I T E C T U R E □ □ □

677 north Washington blvd  
#37  
Sarasota, florida 34236  
voice (941) 952-5875  
schenkelshultz.com



## TITLE PAGE

### DOWNTOWN BRADENTON TRANSIT STATION Bradenton, Florida

#### OWNER

**Manatee County Government**  
1112 Manatee Avenue West  
Bradenton, Florida 34208

#### ARCHITECT

**SCHENKELSHULTZ**  
677 N. Washington Blvd., Suite 37  
Sarasota, Florida 34236  
Phone (941) 952 5875  
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#### STRUCTURAL CONSULTANT

**ZNS Engineering**  
P.O. Box 9448  
Bradenton, Florida 34206  
Phone (941) 748-8080  
Fax (941) 748-3316

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Fax (941) 748-3316



# Downtown Bradenton Transit Station

Bradenton, Florida

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**Downtown Bradenton Transit Station**  
Bradenton, Florida

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PROCUREMENT AND CONTRACTING  
REQUIREMENTS GROUP



# Downtown Bradenton Transit Station

Bradenton, Florida

SECTION 00 31 32  
GEOTECHNICAL DATA

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Subsurface soil investigations to determine the nature of the soil below the natural grade have been made at various locations on the site.

## PART 2 - PRODUCTS

### 2.1 THE REPORT

- A. The "Geotechnical Exploration Report" is enclosed herein. This report was obtained only for use by the Architect in design and is not part of the Contract Documents.

## PART 3 - EXECUTION

### 3.1 USE OF THE REPORT

- A. The boring plan, the summary of test results, and boring logs are made available for information only and are not a warranty of subsurface conditions.
- B. Test borings indicate only the soil conditions at the points where samples were taken and are not intended to indicate the soil conditions for the entire site.
- C. Data on indicated subsurface conditions is not intended as representations or warranties of accuracy or continuity of such soil conditions between soil borings or within a given boring. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by Bidders.
- D. Upon approval of and coordination with the (Construction Manager), (Architect), the Contractor may, at his cost, perform additional borings.
- E. The Bidder shall visit the site and acquaint himself with site conditions.

END OF SECTION 00 31 32

# Downtown Bradenton Transit Station

Bradenton, Florida

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**GEOTECHNICAL EXPLORATION FOR  
“13<sup>TH</sup> STREET BUS TRANSFER STATION,”  
13<sup>TH</sup> STREET WEST,  
BRADENTON,  
MANATEE COUNTY, FLORIDA**



**Ardaman & Associates, Inc.**

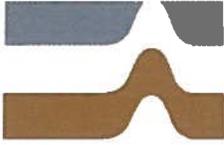
**OFFICES**

**Orlando**, 8008 S. Orange Avenue, Orlando, Florida 32809, Phone (407) 855-3860  
**Bartow**, 1525 Centennial Drive, Bartow, Florida 33830, Phone (863) 533-0858  
**Cocoa**, 1300 N. Cocoa Boulevard, Cocoa, Florida 32922, Phone (321) 632-2503  
**Fort Myers**, 9970 Bavaria Road, Fort Myers, Florida 33913, Phone (239) 768-6600  
**Miami**, 2608 W. 84<sup>th</sup> Street, Hialeah, Florida, 33016, Phone (305) 825-2683  
**Port Charlotte**, 740 Tamiami Trail, Unit 3, Port Charlotte, Florida 33954, Phone (941) 624-3393  
**Port St. Lucie**, 460 NW Concourse Place, Unit #1, Port St. Lucie, Florida 34986-2248, Phone (772) 878-0072  
**Sarasota**, 78 Sarasota Center Boulevard, Sarasota, Florida 34240, Phone (941) 922-3526  
**Tallahassee**, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (850) 576-6131  
**Tampa**, 3925 Coconut Palm Drive, Suite 115, Tampa, Florida 33619, Phone (813) 620-3389  
**West Palm Beach**, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (561) 687-8200

**MEMBERS:**

**A.S.F.E.**

**American Concrete Institute  
American Society for Testing and Materials  
Florida Institute of Consulting Engineers**



Ardaman & Associates, Inc.

Geotechnical, Environmental and  
Materials Consultants

July 2, 2010  
File No. 10-7234

TO: Schenkel Shultz Architecture  
4890 West Kennedy Boulevard, Suite 930  
Tampa FL 33609

Attention: Mr. Drazen Ahmedic, AIA

SUBJECT: Geotechnical Exploration for "13th Street Bus Transfer Station," 13<sup>th</sup> Street West,  
Bradenton, Manatee County, Florida

---

Dear Drazen:

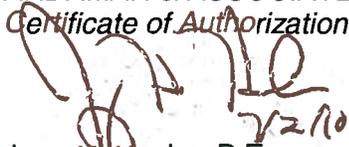
As requested, our firm has completed explorations and analysis of the subsurface soil and pavement conditions at the subject site. This report will present the results of our exploration and our recommendations.

This report was prepared for the exclusive use of Schenkel Shultz Architecture and their consultants, for specific application to the subject site. Our services have been performed in accordance with generally-accepted engineering practices. No other warranty, expressed or implied, is made.

We appreciate the opportunity to be of your service. Please contact our office when we may be of further service or should you have any questions concerning this report.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.  
*Certificate of Authorization No. 5950*

  
Jerry H. Kuehn, P.E.  
Senior Project Engineer  
Fl. License No. 35557

  
Gary H. Schmidt, P.E.  
Vice President  
Fl. License No. 12305

JHK/GHS:nh

cc: Mr. Jeremy Fireline, P.E. – ZNS Engineering

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### APPENDICES

- I SOIL BORING, SAMPLING AND TEST METHODS
- II PAVEMENT CORING AND SOIL BORING LOGS

### FIGURES

- 1 TEST LOCATION PLAN



## 1.0 SCOPE

The scope of our services has included the following items:

1. Obtaining three (3) pavement cores and performing five (5) Standard Penetration Test borings, to determine the nature of the subsurface soils, and existing water table levels and pavement conditions.
2. Reviewing each sample obtained in our field exploration program by a geotechnical engineer in the laboratory for further investigation, classification and assignment of laboratory tests.
3. Analyzing the existing subsurface soil conditions to:
  - a. prepare building foundation design recommendations,
  - b. define existing pavement conditions.
4. Preparing this report to document the results of our field exploration program, engineering analyses and recommendations.

## 2.0 FIELD EXPLORATION

Our field exploration program included conducting three (3) pavement cores and five (5) Standard Penetration Test (SPT) borings. The number and location of the pavement cores were determined by ZNS Engineering. The number, location and depth of the SPT borings were determined by Ardaman & Associates, Inc.

The test locations are shown on the attached Figure 1. The test borings were located in the field by visual reference to available site landmarks. Test locations should be considered accurate only to the degree implied by the method used. Should more accurate locations be required, a registered land surveyor should be retained.

### 2.1 Subsurface Soil Borings

The SPT borings were performed to determine the existing water table and subsurface soil conditions to a maximum depth of 10.5 feet below the existing ground surface. The methods and



equipment used in the borings are described in Appendix I of this report. The soil profiles and water table depths encountered at the time of this exploration are shown on the soil boring logs in Appendix II. The soil descriptions shown on the soil boring logs are based upon the Unified Soil Classification System (ASTM D-2487).

## **2.2 Pavement Cores**

The pavement cores were obtained with a 6-inch diameter, diamond tooth, core barrel; from the asphalt surface to the bottom of the base. A boring was then advanced using hand auger equipment to a depth of approximately 3 feet, to determine the nature and condition of the subgrade soils. Relative density readings were obtained with a calibrated dial hand penetrometer at selected depths as the boring was advanced.

The equipment and procedures used are described in greater detail in Appendix I of this report. The pavement and subgrade soil profile encountered at each location are shown on logs C-1 to C-3 in Appendix II.

## **3.0 LABORATORY TESTING**

Samples obtained during our field exploration program were thoroughly examined in our laboratory to obtain an accurate definition of the pavement and soil profile. Routine tests were performed on selected samples to aid in classification and to better define the engineering properties. These tests included determining the fines (silt and clay) content. The test results are shown at the respective sample depth on the soil boring logs in Appendix II. Based upon the laboratory test results and visual classification procedures, the soils have been classified in general compliance with the Unified Soil Classification System (ASTM D-2487) by a geotechnical engineer.



#### **4.0 ANALYSES AND RECOMMENDATIONS**

Our scope of work included preparing foundation design recommendations for the proposed structures and assessing the general pavement conditions. These will be discussed separately, as follows.

##### **4.1 Structure Foundations**

We understand that the proposed structures include a one-story, approximately 45' x 20' building, plus several shade structures. The soil conditions encountered at the borings are generally well suited to support these relatively light structures upon conventionally designed shallow (spread footing) foundation systems, assuming that the soils are properly prepared.

Based upon the information available to-date, we anticipate that foundations for the proposed structures can be designed for an allowable soil contact pressure of 2,000 pounds per square foot (psf). We recommend that all wall foundations be no less than eighteen inches wide and column foundations be no less than twenty-four inches wide. All foundations should be designed for an equal dead load distribution in accordance with standard building code requirements. A soil cover of eighteen inches, as measured from the bottom of the foundation system to outside adjacent finished grade, should be provided.

The following soil preparation recommendations are made as a guide to the design professionals, parts of which should be incorporated into the project's general specifications:

1. The building areas, plus a margin of 5 feet outside building perimeter lines, should be cleared and grubbed of all surface vegetation and organic debris.
2. The building areas plus a margin of 5 feet outside building perimeter lines, should be compacted with a vibratory roller or vibratory plate compactor. Sufficient passes should be made over the building area, plus the 5.0 foot margin, to produce



a density of at least 95% of Modified Proctor (ASTM D-1557) maximum density to a depth of 1.5 feet below the compacted surface. We recommend that heavy vibratory rollers not be used within 20 feet of existing structures. A representative of Ardaman & Associates should be present during initial compaction efforts.

3. After compaction and testing to verify that the desired compaction has been achieved at this elevation, fill consisting of clean fine sands containing no more than 10% passing the No. 200 sieve, and having a Unified Soil Classification (ASTM D-2487) of "SP" or "SP-SM," can be placed in level lifts not exceeding 12 inches loose thickness and compacted with the equipment described above. Each lift should be compacted to at least 95% of Modified Proctor maximum density prior to the placement of subsequent lifts.
4. Fill necessary to raise the grade from the top of the foundation elevation to finished floor slab subgrade elevation should also consist of clean fine sands meeting the requirements of item No. 3, above, and compacted to at least 95% of Modified Proctor maximum density. If fill is placed inside partially completed walls, extreme care should be exercised to avoid damage to these walls.
5. A geotechnical engineer or his representative from Ardaman & Associates, Inc., Sarasota office, should inspect and test the compacted excavated elevation and each layer of fill to verify compliance with the above recommendations. In addition, a representative should inspect and test the foundation contact soils immediately prior to concrete placement.

#### **4.2 Pavement Conditions**

The existing pavement conditions encountered at the three (3) pavement core locations are shown on logs C-1 to C-3 in Appendix II. As noted, the pavement consisted of approximately 2 to 3 inches of asphaltic concrete over 3-inch thick brick pavers. At location C-3, a 6-inch thick base or stabilized subgrade was encountered. This consisted of a mix of gray fine sand and gravel and was probably intended to be a base material. Our scope of work did not include performing limerock bearing ratio (LBR) testing, which would be required to verify a minimum LBR of 100, which is generally the minimum for a base beneath a flexible (asphalt) pavement.



At location C-1 and C-2, the brick pavers were underlain by gray fine sand that included a trace amount of shell and gravel fragments. The penetrometer readings indicate the subgrade to be in a well compacted state.

The deeper (below a depth of 1.0 to 1.5 feet) soils were generally in a medium dense state, although in a loose to medium dense state below a depth of approximately 2.5 feet. No very loose soils, muck or other detrimental pavement subgrade soil conditions were encountered within our boring depths.

## **5.0 CLOSURE**

The analyses and recommendations submitted in this report are based upon the results of subsurface borings performed at the locations indicated on the attached Figure 1. This report does not reflect any variations which may occur between the borings. While the borings are representative of the subsurface conditions at the respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered.

The boring logs and related information are based upon the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate, and the description represents our interpretation of the subsurface conditions at the designated boring location on the particular date drilled. The absence of a water table listed on a boring log does not indicate that the water table is not within the boring depth, unless expressly stated so.



**APPENDIX I**  
**SOIL BORING, SAMPLING & TEST METHODS**

## SOIL BORING, SAMPLING AND TESTING METHODS

### Standard Penetration Test

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density and, for cohesive soils, an approximate unconfined compressive strength ( $Q_u$ ):

Cohesionless Soils:	<u>N-Value</u>	<u>Description</u>
	0 to 4	Very loose
	4 to 10	Loose
	10 to 30	Medium dense
	30 to 50	Dense
	Above 50	Very dense

Cohesive Soils:	<u>N-Value</u>	<u>Description</u>	<u><math>Q_u</math> (ton/ft<sup>2</sup>)</u>
	0 to 2	Very soft	Below 0.25
	2 to 4	Soft	0.25 to 0.50
	4 to 8	Medium stiff	0.50 to 1.0
	8 to 15	Stiff	1.0 to 2.0
	15 to 30	Very stiff	2.0 to 4.0
	Above 30	Hard	Above 4.0

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from each sampling interval and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. After thorough examination and testing of the samples, the samples are discarded unless prior arrangements have been made. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

### Hand Auger Borings

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5 to 9 feet) depth or when access is not available to

power drilling equipment. A 3-inch diameter, hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved to the surface at approximately 6-inch intervals and its contents emptied for inspection. The soil sample so obtained is classified and representative samples put in bags or jars and transported to the laboratory for further classification and testing.

### **Calibrated Dial Hand Penetrometer**

The calibrated dial hand penetrometer is used to determine the degree of compactness or consistency of soils. The calibrated dial hand penetrometer consists of a 4-foot long hardened steel shaft, 0.5 inch in diameter, with a stainless steel or chrome cone point. A deformation dial with 0.001-inch division measurements is mounted in a proving ring at the top of the penetrometer shaft. The cone point is pressed into the soil by hand, and the dial reading recorded at 4, 6 or 12 inch increments. The firmness of the soil may be measured to a depth of up to 4 feet, or the length of the shaft.

After obtaining resistance readings, the degree of compactness may be obtained from a calibration chart (attached). This chart also gives the bearing capacity for approximately one inch of settlement for footings that do not exceed 7' x 7' in dimension.

The calibrated dial hand penetrometer is not designed to replace or eliminate laboratory control or soil tests for control of fill placement. It is, however, a useful tool to predetermine the uniformity of compacted soil masses, prior to obtaining soil density measurements.

### **Laboratory Test Methods**

Soil samples returned to our laboratory are examined by a geotechnical engineer or geotechnician to obtain more accurate descriptions of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to further define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as described in this report. The soil descriptions shown on the logs are based upon a visual-manual classification procedure in general accordance with the Unified Soil Classification System (ASTM D-2488-84) and standard practice. Following is a list of abbreviations which may be used on the boring logs or elsewhere in this report.

- 200 - Fines Content (percent passing the No. 200 sieve); ASTM D-1140
- DD - Dry Density of Undisturbed Sample; ASTM D-2937
- Gs - Specific Gravity of Soil; ASTM D-854
- k - Hydraulic Conductivity (Coefficient of Permeability)
- LL - Liquid Limit; ASTM D-423
- OC - Organic Content; ASTM D-2974
- pH - pH of Soil; ASTM D-2976
- PI - Plasticity Index (LL-PL); ASTM D-424
- PL - Plastic Limit; ASTM D-424
- Qp - Unconfined Compressive Strength by Pocket Penetrometer;
- Qu - Unconfined Compressive Strength; ASTM D-2166 (soil), D-2938 (rock)
- SL - Shrinkage Limit; ASTM D-427
- USCS - Unified Soil Classification System; ASTM D-2487, D-2488
- w - Water (Moisture) Content; ASTM D-2216

## Soil Classifications

The soil descriptions presented on the soil boring logs are based upon the Unified Soil Classification System (USCS), which is the generally accepted method (ASTM D-2487 and D-2488) for classifying soils for engineering purposes. The following modifiers are the most commonly used in the descriptions.

For Sands:	<u>Modifier</u>	<u>Fines, Sand or Gravel Content*</u>
	"with silt" or "with clay"	5% to 12% fines
	"silty" or "clayey"	12% to 50% fines
	"with gravel" or "with shell"	15% to 50% gravel or shell
For Silts or Clays:	<u>Modifier</u>	<u>Fines, Sand or Gravel Content*</u>
	"with sand"	15% to 30% sand and gravel; and % sand > % gravel
	"sandy"	30% to 50% sand and gravel; and % sand > % gravel
	"with gravel"	15% to 30% sand and gravel; and % sand < % gravel
	"gravelly"	30% to 50% sand and gravel; and % sand < % gravel

\* may be determined by laboratory testing or estimated by visual/manual procedures. Fines content is the combined silt and clay content, or the percent passing the No. 200 sieve.

Other soil classification standards may be used, depending on the project requirements. The AASHTO classification system is commonly used for highway design purposes and the USDA soil textural classifications are commonly used for septic (on-site sewage disposal) system design purposes.

**APPENDIX II**

**PAVEMENT CORING AND SOIL BORING LOGS**

**BORING LOCATION:** see Figure 1

**CLIENT:** Schenkel Shultz Architecture

**DATE DRILLED:** 6/21/10 **START:**

**FINISH:**

**PROJECT:** 13th Street Bus Transfer Station

**GROUND SURFACE ELEVATION:**

**LOCATION:** 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

**WATER TABLE DEPTH:** NE **TIME:**

**DATE:** 6/21/10

**DRILL CREW:** MM

**LOGGED BY:** MM

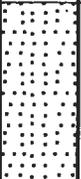
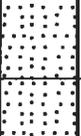
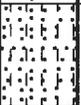
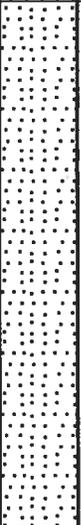
**DRILL MAKE & MODEL:** \_\_\_\_\_ **BIT:** 6" dia. core barrel **DRILLING RODS:** \_\_\_\_\_

**DRILLING METHOD:** pavement core, then hand auger **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH, FT.	ELEVATION, FT	PENETROMETER READING (PSF)	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT (%)	LIQUID LIMIT	PLAST. INDEX
0						3-1/8" asphaltic concrete					
						3" brick pavers					
0.5		>3000			SP	gray fine sand (trace crushed shell)					
1		2500			SP-SM	dark brown fine sand with silt					
1.5					SP	yellowish brown fine sand					
2		2500			SP	pale yellowish brown fine sand					
2.5		1700									
3		1200				end of boring					
3.5											

**BORING LOCATION:** see Figure 1  
**CLIENT:** Schenkel Shultz Architecture  
**DATE DRILLED:** 6/21/10 **START:** **FINISH:**  
**PROJECT:** 13th Street Bus Transfer Station  
**GROUND SURFACE ELEVATION:**  
**LOCATION:** 13th St. West and 6th Ave. West,  
 Bradenton, Manatee County, Florida  
**WATER TABLE DEPTH:** NE **TIME:** **DATE:** 6/21/10  
**DRILL CREW:** MM **LOGGED BY:** MM

**DRILL MAKE & MODEL:** \_\_\_\_\_ **BIT:** 6" dia. core barrel **DRILLING RODS:** \_\_\_\_\_  
**DRILLING METHOD:** pavement core, then hand auger **WEATHER CONDITIONS:** \_\_\_\_\_

DEPTH, FT.	ELEVATION, FT	PENETROMETER READING (PSF)	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT (%)	LIQUID LIMIT	PLAST. INDEX
0						3-1/8" asphaltic concrete					
						3" brick pavers					
0.5		>3000			SP	gray fine sand (trace shell & gravel)					
1		2500			SP	gray fine sand					
1.5		2200			SP-SM	dark brown fine sand with silt					
2		2400			SP	yellowish brown fine sand					
2.5		2400									
3						end of boring					
3.5											

BORING LOCATION: see Figure 1

CLIENT: Schenkel Shultz Architecture

DATE DRILLED: 6/21/10 START:

FINISH:

PROJECT: 13th Street Bus Transfer Station

GROUND SURFACE ELEVATION:

LOCATION: 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

WATER TABLE DEPTH: NE TIME:

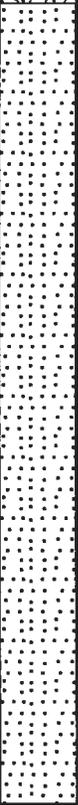
DATE: 6/21/10

DRILL CREW: MM

LOGGED BY: MM

DRILL MAKE & MODEL: \_\_\_\_\_ BIT: 6" dia. core barrel DRILLING RODS: \_\_\_\_\_

DRILLING METHOD: pavement core, then hand auger WEATHER CONDITIONS: \_\_\_\_\_

DEPTH, FT.	ELEVATION, FT.	PENETROMETER READING (PSF)	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT (%)	LIQUID LIMIT	PLAST. INDEX
0						2-1/4" asphaltic concrete					
						3" brick pavers					
0.5		>3000			SP	6" base or stabilized subgrade (gray fine sand & gravel)					
1		>3000			SP	pale brown fine sand					
1.5		2400									
2		2100									
2.5		1600									
3						end of boring					
3.5											

**BORING LOCATION:** see Figure 1  
**CLIENT:** Schenkel Shultz Architecture  
**DATE DRILLED:** 6/25/10 **START:** **FINISH:**  
**PROJECT:** 13th Street Bus Transfer Station  
**GROUND SURFACE ELEVATION:**  
**LOCATION:** 13th St. West and 6th Ave. West,  
 Bradenton, Manatee County, Florida  
**WATER TABLE DEPTH:** 6.7 **TIME:** **DATE:** 6/25/10  
**DRILL CREW:** DP/MO **LOGGED BY:** DP

**DRILL MAKE & MODEL:** CME-45 **BIT:** 2-3/8" tricone **DRILLING RODS:** AW  
**DRILLING METHOD:** rotary with SPT **WEATHER CONDITIONS:**

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0					pavement (asphalt & base)					
	13	1		SP	gray fine sand					
		2		SP	brown gray fine sand					
2				SP	pale brown fine sand					
	12	3								
				SP	pale yellowish brown fine sand					
4	9	4		SP	light gray to white fine sand					
6	19									
	18	5								
8				SP	light gray fine sand					
	15									
10	13	6								
					end of boring					
12										
14										

BORING LOCATION: see Figure 1

CLIENT: Schenkel Shultz Architecture

DATE DRILLED: 6/25/10 START: FINISH:

PROJECT: 13th Street Bus Transfer Station

GROUND SURFACE ELEVATION:

LOCATION: 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

WATER TABLE DEPTH: 7.0 TIME: DATE: 6/25/10

DRILL CREW: DP/MO

LOGGED BY: DP

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone DRILLING RODS: AW

DRILLING METHOD: rotary with SPT WEATHER CONDITIONS:

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0					pavement (asphalt over brick pavers)					
12		1		SP-SM	dark brown fine sand with silt					
		2		SP	brown gray fine sand					
2				SP	pale brown fine sand					
17		3								
				SP	pale yellowish brown fine sand					
4	11	4		SP	light gray fine sand					
17										
6										
17		5								
8										
										
16				SP	gray fine sand					
10	15	6								
										
					end of boring					
12										
14										

BORING LOCATION: see Figure 1

CLIENT: Schenkel Shultz Architecture

DATE DRILLED: 6/25/10 START:

FINISH:

PROJECT: 13th Street Bus Transfer Station

GROUND SURFACE ELEVATION:

LOCATION: 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

WATER TABLE DEPTH: 6.8 TIME:

DATE: 6/25/10

DRILL CREW: DP/MO

LOGGED BY: DP

DRILL MAKE & MODEL: CME-45

BIT: 2-3/8" tricone

DRILLING RODS: AW

DRILLING METHOD: rotary with SPT

WEATHER CONDITIONS:

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0					pavement (asphalt over brick pavers)					
17				SP-SM	dark gray fine sand with silt					
2		1		SP	pale yellowish brown fine sand					
4	8	2		SP	light gray fine sand					
6	17	3		SP	gray fine sand					
18										
8										
10	15	4					4.4			
					end of boring					
12										
14										

BORING LOCATION: see Figure 1

CLIENT: Schenkel Shultz Architecture

DATE DRILLED: 6/28/10 START:

FINISH:

PROJECT: 13th Street Bus Transfer Station

GROUND SURFACE ELEVATION:

LOCATION: 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

WATER TABLE DEPTH: 5.6 TIME:

DATE: 6/25/10

DRILL CREW: DP/MO

LOGGED BY: DP

DRILL MAKE & MODEL: CME-45 BIT: 2-3/8" tricone DRILLING RODS: AW  
DRILLING METHOD: rotary with SPT WEATHER CONDITIONS:

DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0					pavement (asphalt over brick pavers)					
10	1			SP	brown fine sand					
2				SP	pale brown fine sand					
10	2			SP	yellowish brown fine sand					
4	12	3		SP	light gray fine sand		2.1			
10				SP	brown fine sand					
6										
8	4									
8										
17	17			SP	brown fine sand					
10	14	5								
					end of boring					
12										
14										

BORING LOCATION: see Figure 1

CLIENT: Schenkel Shultz Architecture

DATE DRILLED: 6/28/10 START:

FINISH:

PROJECT: 13th Street Bus Transfer Station

GROUND SURFACE ELEVATION:

LOCATION: 13th St. West and 6th Ave. West,  
Bradenton, Manatee County, Florida

WATER TABLE DEPTH: 5.9 TIME:

DATE: 6/25/10

DRILL CREW: DP/MO

LOGGED BY: DP

DRILL MAKE & MODEL: CME-45

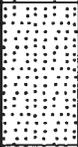
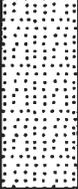
BIT: 2-3/8" tricone

DRILLING RODS:

AW

DRILLING METHOD: rotary with SPT

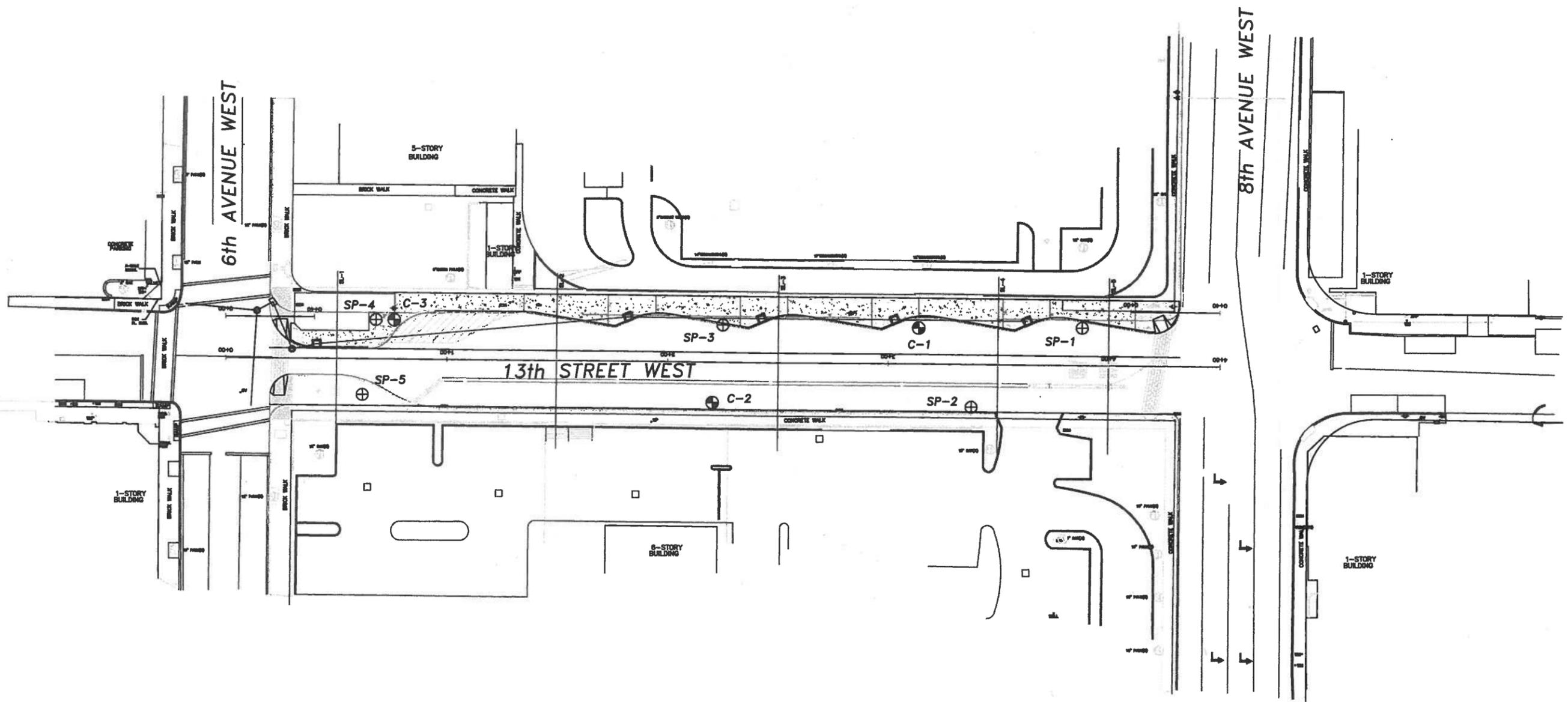
WEATHER CONDITIONS:

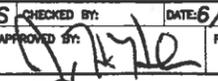
DEPTH, FT.	SPT N-VALUE	SAMPLE NO.	GRAPHIC LOG	USCS	SOIL DESCRIPTION	WATER CONTENT (%)	PERCENT FINES	ORGANIC CONTENT	LIQUID LIMIT	PLAST. INDEX
0					pavement (asphalt over brick pavers)					
9	1	1		SP	brown fine sand					
2	8	2		SP	yellowish brown fine sand					
4	12	3		SP	pale yellowish brown fine sand					
6	11	4		SP	light gray to white fine sand					
10	10			SP	pale brown fine sand					
8	11									
10	16	5			end of boring					
12										
14										



SCALE: 1"=50'

- ⊕ PAVEMENT CORE LOCATION
- ⊕ STANDARD PENETRATION TEST BORING LOCATION



 <b>Ardaman &amp; Associates, Inc.</b> Geotechnical, Environmental and Materials Consultants			
<b>Test Locations</b> 13th Street Bus Transfer Station Manatee County, Florida			
DRAWN BY: KGS	CHECKED BY:	DATE: 6/23/10	
FILE NO. 10-7234	APPROVED BY: 	FIGURE:	1

# Downtown Bradenton Transit Station

Bradenton, Florida

SECTION 00 43 20  
FLORIDA TRENCH SAFETY ACT

## FLORIDA TRENCH SAFETY ACT CERTIFICATE OF COMPLIANCE

I as bidder, on this project, acknowledge that included in the various items of the proposal and in the Total Bid Price are costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) effective October 1, 1990. I as bidder, further identify the costs to be as summarized below:

		<u>QUANTITY</u>	<u>UNIT COST</u>	<u>AMOUNT</u>
1.	Trench Safety Act Compliance	_____	LF _____	=
2.	Special Shoring	_____	SF _____	=

Identify method of compliance for item #1:

\_\_\_\_\_.

Identify or attach a copy of the Special Shoring requirements for item #2:

\_\_\_\_\_.

The undersigned certifies that he/she is the contractor who will perform the trench excavation for this Project, and hereby gives written assurance that he/she will comply with the applicable Trench Safety Standards specifically set forth in Florida's Trench Safety Act, Laws of Florida, 90-96.

FIRM:

BY:

NAME:

TITLE:

# Downtown Bradenton Transit Station

Bradenton, Florida

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

NOTARY PUBLIC

My Commission Expires:

END OF SECTION 00 43 20

# Downtown Bradenton Transit Station

Bradenton, Florida

SECTION 00 73 00  
SUPPLEMENTARY CONDITIONS

## 1 - GENERAL PROVISIONS

### 1.1 BASIC DEFINITIONS

Add the following definitions or sentences to the General Conditions Section

Engineer – Engineer or Architect of record.

Engineering – Professional work done by either a registered Engineer or an Architect.

Work – (Add the following sentence to the end of the Subparagraph) "...The Contractor acknowledges and agrees that the Contract Documents are sufficient to provide for the completion of the Work and include Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in accordance with applicable laws, codes, and customary standards of the construction industry."

Supplier –(Add the following sentence to the end of the Subparagraph) "... The term "supplier" as used herein, includes a firm or organization furnishing or delivering products directly to the jobsite, and because of such direct delivery, could be construed under the lien laws of the State in which the work is being performed as having lien rights against the funds due the Contractor. Suppliers of material and equipment, delivering to Contractor or Subcontractor on an open account basis and not having lien rights on the Work, will not be considered suppliers within the meaning of the Contract Documents.

### 1.2 MISCELLANEOUS DEFINITIONS

- A. The term "product" as use herein includes materials, systems, and equipment.
- B. A bidder selected to enter into a Contract with the Owner for Work included under the bidder's proposal is termed an "Awardee," until such time as he is awarded a Contract and becomes the Contractor.
- C. Where "complete" is used, it shall mean "complete with connections, supports, attachments and incidental items necessary for a finished and properly operating assembly or installation."
- D. The term "furnish" - to supply (only) to another party for their use of installation, including cost of delivery and unloading at the jobsite.
- E. The term "install" - to distribute, uncrate, assemble, and fix into the intended final positions, the installer to provide all miscellaneous hardware and supplies required to anchor and support securely, clean-up, and dispose of rubbish.
- F. The term "connect" - to bring service(s) to point of installation and make final connections to the service(s) to the installed equipment, and to provide miscellaneous auxiliary appurtenances necessary to make operable for its intended use.
- G. The term "provide" - to furnish, install, and connect complete.

# Downtown Bradenton Transit Station

Bradenton, Florida

- H. The term "or equal" means an equal approved in writing by the Architect at least 10 days prior to bid receipt, and listed in an Addendum.

## 1.3 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

The intent of Contract Documents is to include all items necessary for the proper execution and completion of the Work by the contractor. The contract documents are complementary, and what is required by one shall be as binding as if required by all. If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply:

- A. The terms and conditions as set forth in the Bidding Requirements, including legal advertisement thereof, shall have full force and effect until such time as the Standard Form of Agreement between Owner and Contractor is executed between the Owner and the Awardee.
- B. Where there is a conflict between the Bidding Requirements and the Contract Documents, the Contract Documents shall govern.
- C. Where there is conflict between the requirements of the General Conditions of the Contract and the Supplementary Conditions, the requirements of the Supplementary Conditions shall govern, except where the requirements set forth in the Supplementary Conditions are contrary to law, in which case the legal requirements shall govern. The General Conditions of the Contract shall take precedence over other Contract Documents.
- D. Where there is conflict between the Drawings and Specifications and conflict within the Drawings or within the Specifications, the conflict, where applicable, shall be resolved by providing better quality or greater quantity as indicated in the Contract Documents.
- E. It is the intent of the Contract Documents to accomplish a complete and first-grade installation in which there shall be installed new products of the latest and best design and manufacturer, and workmanship shall be thoroughly first class, executed by competent and experienced workmen.
- F. Details of preparation, construction, installation, and finishing encompassed by the Contract Documents shall conform to the best practices of the respective trades, and that workmanship, construction methods, shall be of first class quality so as to accomplish a neat and first class finished job.
- G. Where specific recognized standards are mentioned in the Specifications, it shall be interpreted that such requirements shall be complied with.
- H. The intent of the Contract Documents is to include all labor, equipment, and materials necessary for the proper and timely execution and completion of the Work, even though such labor, equipment, materials are not expressly included in the Contract Documents.
- I. The Contract Documents are complimentary, and what is required by one will be as binding as if required by all.

# Downtown Bradenton Transit Station

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- J. The Contractor will be required to perform all parts of the Work, regardless of whether the parts of the Work are described in Sections of the Contract Documents applicable to other trades.

## 2 - OWNER

### 2.1 INFORMATION AND SERVICES REQUIRED OF THE OWNER

- A. Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing structures including those charges and costs related to zoning changes, environmental impact statements, and similar requirements related to use of the site."
- B. The Owner shall not be responsible for furnishing surveys (unless required for the execution of the Work and requested by the Contractor in writing) or other information as to the physical characteristics of, legal limitations of, or utility locations for the Project site, but as necessary for the Work, shall furnish or cause to be furnished to the Contractor a legal description of the project site, which shall not constitute one of the Contract Documents. The Contractor shall confirm the location of each utility; shall relocate or dispose of each on-site utility and shall cap each utility as required by the Work or the Specifications. The Contractor shall not be entitled to additional compensation resulting from its failure to confirm the location of the site utilities or existing structures prior to the opening of its bid.

## 3 - CONTRACTOR

### 3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- A. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.
- B. Where there is a conflict in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the more expensive way of doing the Work and the larger quantity required. Only changes or interpretations covered by Addenda or written from the Architect will be permitted during construction of the Work. The Contractor shall perform no portion of the Work at any time without Contract Documents or where required, received Shop Drawings, Product Data, or Samples for such portion of the Work.
- C. Because the Contract Documents are complimentary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to the portion of the Work, as well as the information furnished by the Owner as it applies to the scope of work. Contractor shall be responsible for field measurements and shall take notice of all site conditions effecting the project and project scope. Contractor shall inform the Owner and Architect of such observations and their impact on the project in its entirety. The Contractor shall promptly inform the Architect of any errors, omissions, or inconsistencies in the Contract Documents discovered through review, request for

# Downtown Bradenton Transit Station

Bradenton, Florida

information, change orders, or any other means in a format that Architect defines with a clear description of the item and its impact on the project scope. Before ordering material or performing any Work, the contractor shall verify all measurements at the Project site. Any differences between dimensions on the Drawings and actual measurements shall be brought to the Architect's attention for consideration before the Work proceeds. Where actual measurements require more material and work than the Drawings call for, such material and Work shall be supplied at the cost of the Contractor. No extra compensation will be allowed because of difference between actual measurements and dimensions indicated on the Drawings. The Contractor shall assume full responsibility for accuracy of measurements obtained at the work site.

- D. If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information the Contractor shall make Claims per specifications and inform the Architect in writing. If the Contractor fails to perform this obligation in a timely manner adequate for a reasonable response and adjustments by the Architect/Owner, the Contractor shall pay for such costs of damages to the Owner.
- E. Mechanical and Electrical Drawings are diagrammatic only. Actual work involved shall be installed from received Shop Drawings with all measurements obtained at the Project Site by the Contractor.
- F. Dimensions which are lacking from the Drawings shall be obtained from the Architect or field verified. In no case will the Contractor assume that the Drawings are scaled.
- G. General contractor is responsible for securing all permits and for permit fees. Contractor is responsible for all permits, fees, licenses, and inspections by government agencies necessary for proper execution and completeness of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. Certain permits have been obtained by the Owner, it is the responsibility of the Contractor to coordinate with the Owner and determine the outstanding permit requirements and balance of fees associated with the permits.

## 3.2 WARRANTY AND LABOR AND MATERIALS

- A. Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of Work.
- B. The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper conditions to receive subsequent Work. Architect shall reserve a right to inspection of construction to assure compliance to the Contract Documents. Contractor shall be responsible for Work compliance to the Contractor Documents.
- C. The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free of defects. In addition to any other warranties, guarantees, or obligations set forth in the Contract Documents or applicable as a matter of law and not in limitation of the terms of the

# Downtown Bradenton Transit Station

Bradenton, Florida

Contract Documents, the Contractor warrants and guarantees that:

1. The Owner will have good title to the Work and materials and equipment incorporated into the Work will be new.
  2. The Work and materials and equipment incorporated into the Work will be free from defects, including defects in the workmanship or materials.
  3. The Work and equipment incorporated into the Work will be fit for the purpose for which they are intended.
  4. The Work and materials and equipment incorporated into the Work will be merchantable.
  5. The Work and materials and equipment incorporated into the Work will conform in all respects to the Contract Documents.
- D. The Contractor shall, upon completion of the Work, assign to the Owner all warranties obtained or obtainable by, the Contractor from manufacturers and suppliers of equipment and materials incorporated into the Work by written instrument of assignment in a form acceptable to the Owner.
- E. For a period of three years from the date of final completion and acceptance of the Work by the Owner, as evidenced by the date of the Substantial Completion, the Contractor warrants to the Owner all movable windows, apparatus, machinery, mechanical and electrical equipment. For the same period, the Contractor warrants to Owner to make good, at his own expense, any defects, shrinkages, warpages or other faults in Work required under this Contract arising out of defective materials or workmanship, ordinary wear and tear excepted.
- F. As part of the above warranty, it is expressly understood and agreed that the Contractor warrants that the Contractor's portion of the Work shall be waterproof and weatherproof in every respect for a period of three (3) years from the Date of Substantial Completion.
- G. The Contractor warrants and represents to the Owner that the Drawings and Specifications for the Work are suitable and adapted for said Work, and guarantees the sufficiency of said Drawings and Specifications for their intended purpose and agrees that it will perform said construction work and complete same to the entire satisfaction of the Owner and Architect.
- H. In addition to all of Contractor's warranties and obligations to correct defective Work provided by law or as set forth in any of the Contract Documents, the Contractor agrees, upon notice from Owner or Architect, immediately to repair, restore, correct and cure, at Contractor's expense, all defects and omissions in workmanship and materials and all failures to comply with the Contract Documents which appear within three (3) years from the Date of Substantial Completion. Contractor shall pay for, and if requested, correct, repair, restore and cure any damage or injury, whenever the same shall occur or appear, resulting from any defects, omissions or failure in workmanship and materials, and indemnify, hold harmless, and defend Owner against any and all claims, losses, costs, damages and expenses, including attorney's fees, suffered by Owner as a result of such damage or injury, whenever such damage or injury shall occur or appear.
- I. The foregoing guarantees and warranties shall not shorten any longer warranty or liability period provided for by law or in the plans, drawings or specifications or otherwise received from Contractor or any subcontractor, material supplier or manufacturer of Contractor nor supersede the terms of any liability for defective Work, but shall be in addition thereto, and shall be in addition to all manufacturer's and factory warranties.

# Downtown Bradenton Transit Station

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- J. All guarantees or warranties upon any Work, labor, materials, or equipment by any subcontractor or material supplier of Contractor shall be deemed made by Contractor to Owner. All guarantees and warranties shall survive Owner's final acceptance of the Project. Neither the acceptance of any of the Work by Owner, in whole or in part, nor any payment, either partial or final, by Owner to Contractor, shall constitute a waiver by Owner of any claims against Contractor for defects in the Work, whether latent or apparent, and no such payment or acceptance of the Work by Owner shall release or discharge Contractor or Contractor's surety from any such claims for breach of such warranties.
- K. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the project site during the performance of the Work. The superintendent shall represent the Contractor and communication given by the superintendent shall be as binding as if they were given by the Contractor. The Superintendent shall be satisfactory to the Architect and the Owner, and the Architect and Owner shall have the right to require the Contractor to remove a Superintendent and replace with a Superintendent who is satisfactory to the Architect and Owner. The Contractor shall not replace the Superintendent without the consent of the Architect and Owner, except with another Superintendent who is satisfactory to the Architect and Owner.
- L. The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to perform the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributed to corrections.
- M. All observed or uncovered conditions on site that differ than those anticipated by the Contract Documents shall be reported to the Architect for investigation and direction. The Contractor shall inform the Architect of such conditions no later than 21 days after the first observance of such conditions.
- N. The Contractor shall submit a schedule of Work to the Owner and Architect promptly after the contract award.
- O. The Contractor shall perform Work so as not to interfere with the Owner's ongoing activities and so as not to create any hazards to the Owner's employees or members of the public using the Owner's property.
- P. Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the Owner to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the Engineer. The costs for obtaining all permits shall be borne by the Contractor.
- Q. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning.

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- R. In the event of inclement weather, or whenever Engineer shall direct, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractors to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.
- S. The Contractor shall do all groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner.
- T. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands , excessive noise or dust . Sound levels must meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance) or latest edition of the ordinances. Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or County f or excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to contract time and contract price. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

## 3.3 PROTECTION OF PROPERTY AND PERSONS

- A. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work under this Contract. The Contractor shall promptly remedy any damages and loss caused to the property or persons.
- B. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:
  - .1 employees on the Work and other persons who may be affected.
  - .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
  - .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of Construction.

## 4 - ARCHITECT

### 4.1 GENERAL

- A. The term "Architect," "Architect/Engineer," or "Engineer" as used herein means the Architect or his authorized representative.
- B. To the fullest extent permitted by law the Contractor shall indemnify and hold harmless

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the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work or any site safety responsibilities which are the responsibility of the Contractor. Contractor shall further indemnify the above agents from any unforeseen damages to the Work or materials due to accidental causes or natural causes. The Contractor shall also indemnify the above stated agents from all royalty and patent rights, all associated fees for royalty and patents shall be the responsibility of the Contractor.

- C. The Architect shall provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during the construction until the date the Architect issues the final Certificate For Payment. The Architect shall have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents. The Architect shall not be held responsible for construction means, methods, technique, sequences or procedures of any safety precautions.
- D. Based on the Architect's evaluations of the Contractor's Application for Payment, the Architect shall review and certify the amounts due to the Contractor and will issue Certificates for Payment in such amounts. See Submittals section in the specifications for more info on Certificates of Payment procedures.
- E. Architect has authority to reject Work that does not comply with the Contract Documents. Architect shall have the authority to require inspections or testing of the Work whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor or any other subcontractors, suppliers, installers or their agents or employees, or any entities performing portions of Work.
- F. Interpretations and decisions of the Architect will be consistent with the intent of the Construction Documents and will be made in writing or drawing format. The Architect will endeavor to secure faithful performance by both the Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

## 5 - SUBCONTRACTORS

### 5.1 AWARD OF SUBCONTRACTORS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- A. The Contractor shall furnish to the Architect in writing the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work, in accordance with the requirements under Specification Section 01300, Submittals, in a form acceptable to the Architect, for review by the Owner and the Architect.
- B. The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objections to such substitution. The Owner may require the Contractor to change a Subcontractor or Sub-subcontractor previously approved, and, if at such time the Contractor is not in default under this Agreement, the Contract sum shall be increased or decreased by the difference in the cost resulting from the change.

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- C. Any part of the Work performed for the Contractor by a Subcontractor or its Sub-subcontractor shall be pursuant to a written Subcontract between the Contractor and such Subcontractor (or the Subcontractor and its Sub-subcontractor at any tier). Architect will assume no responsibility for reviewing, monitoring, or verifying activities or relationships involving a Subcontractor or its Sub-subcontractor.

## 5.2 DELAYS AND EXTENSION OF TIME

- A. If the Contractor is delayed at any time in its progress of the Work by one of the delays for which an extension of time is permitted and gives the Architect written notice specifically describing the delay within 48 hours of its commencement, the date for the Substantial Completion of the Work will be extended by Change Order for such reasonable time as the Architect may determine. The failure to give such notice will constitute an irrevocable waiver of the contractor's right to seek an extension of the time for completion will be delays caused by the i) Architect, or the Owner, ii) physical damage to the Project over which the Contractor has no control, iii) labor disputes beyond the control of the Contractor, and iv) unusually severe weather conditions not reasonably anticipated (temperature, rain, or other precipitation within a range of twenty percent (20%) of normal amounts for the time of the year covered by the Agreement shall not be considered unusually severe weather conditions). Extensions of time will only be granted pursuant to the procedures for Change Orders set forth in the General Conditions. The Contractor agrees not to make claims for compensation for delays or acceleration in the performance of the Work resulting from acts or failure to act by the Owner, the Architect, or the employees, agents, or representatives of the Owner, or the Architect and agrees that such claim shall be fully compensated by an extension of time to complete the Work, regardless of when granted.
- B. If in the opinion of the Architect the Work is behind where it is supposed to be in the Project Time Schedule or it is likely that the Work will not be substantially complete by the applicable date for Substantial Completion, the Contractor upon written notice from the Architect and without additional cost or compensation will increase its work force and, if requested by the Architect, work such overtime to make up for the delay. Should the Contractor fail to increase its work force, work overtime, or proceed to make up for the delay to the satisfaction of the Architect or the Owner, the Architect or the Owner, in addition to other remedies under this Agreement and other Contract Documents, will have the right to cause other Contractors to work overtime and to take whatever other action is deemed necessary to avoid delay in the Substantial Completion of the Work and of the Project, and the cost and expense of such overtime and other action will be borne by the Contractor and may be set off against sums due the Contractor.

## 6 - UNCOVERING AND CORRECTION OF WORK

### 6.1 CORRECTION OF WORK

- A. Within 48 hours after written notices from the Architect, or the Owner (except such period shall be 7 days when notice is given after final payment) that the work does not conform to the Contract Documents, or immediately upon oral notice, if the nonconformance constitutes a threat to the safety of persons or property, the Contractor, without waiting for the resolution of disputes that may exist i) shall commence to correct such nonconformance, ii) shall thereafter use its best efforts to where an extension of time is

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granted in writing by the Owner, shall complete necessary corrections so that the nonconformance is eliminated to the satisfaction of the Architect, and the Owner within 7 days of such notice. The Contractor shall bear all costs of correcting the nonconformance, including additional testing and inspections and additional service fees of the Architect. The notice provided for in this Subparagraph may be given at any time. It is the intent that the obligations under this Subparagraph shall continue to apply after final completion and final payment.

- B. If the Contractor fails to correct nonconforming Work the Owner may correct it in accordance with Contract. If the Subcontractor does not proceed with correction of such nonconforming Work as provided in the Contract, the Owner may remove it and store the salvageable materials or equipment at the Contractor's expense.

## 6.2 ACCEPTANCE OF NONCONFORMING WORK

- A. The acceptance of nonconforming Work by the Owner shall be by written Change Order, signed by the Owner's authorized representative. No person has authority to accept nonconforming work except pursuant to such written Change Order.

## 7 – CONTRACT CLOSEOUT

### 7.1 SUBSTANTIAL COMPLETION

- A. The Contractor shall submit the following items when the Contractor considers the work to be substantially complete:
  - 1. A written notice that the work, or designated portion thereof, is substantially complete.
  - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the Architect and Owner shall make an inspection to determine the status of completion.
- C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.
- D. If the Architect determines that the work is not substantially complete:
  - 1. The Architect shall notify the Contractor in writing, stating the reasons.
  - 2. The Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the Architect.
  - 3. The Architect shall re-inspect the work.
- E. When the Architect finds that the work is substantially complete:
  - 1. He shall prepare and deliver to the Owner a tentative Certificate of Substantial Completion with a tentative list of the items to be completed or corrected before final payment.

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2. The Architect shall consider any objections made by the Owner as provided in Conditions of the Contract. When the Architect considers the work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

## 7.2 FINAL INSPECTION

- A. When the Contractor considered the work to be complete, he shall submit written certification stating that:
  1. The Contract Documents have been reviewed.
  2. The work has been inspected for compliance with Contract Documents.
  3. The work has been completed in accordance with Contract Documents.
  4. The equipment and systems have been tested in the presence of the Owner's representative and are operational.
  5. The work is completed and ready for final inspection.
- B. The Architect shall make an inspection to verify the status of completion after receipt of such certification.
- C. If the Architect determines that the work is incomplete or defective:
  1. The Architect shall promptly notify the Contractor in writing, listing the incomplete or defective work.
  2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Architect that the work is complete.
  3. The Architect shall re-inspect the work.
- D. Upon finding the work to be acceptable under the Contract Documents, the Engineer shall request the Contractor to make closeout submittals.
- E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the work, the Contractor shall reimburse the Owner for the Architect's fees.

## 7.3 CONTRACTOR'S CLOSOUT SUBMITTALS TO ARCHITECT

- A. Project Record Documents (prior to substantial completion).
- B. Operation and maintenance manuals (prior to substantial completion).
- C. Warranties and Bonds.

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- D. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.
- E. Certificate of Insurance for Products and Completed Operations.
- F. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit.

## 7.4 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Architect.
- B. Statement shall reflect all adjustments to the Contract Sum.
- C. Project Management shall prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.
- D. Final application for payment shall be made per contract document procedures.

END OF SECTION 00 73 00

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SECTION 00 73 10  
FLORIDA STATUTES

## SWORN STATEMENT PURSUANT TO SECTION 287.133(3)(a), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to \_\_\_\_\_ (Owner's Name) \_\_\_\_\_

By \_\_\_\_\_  
[print individual's name and title]

for \_\_\_\_\_  
[print name of entity submitting sworn statement]

whose business address is \_\_\_\_\_

and (if applicable) its Federal Employer Identification Number (FEIN) is \_\_\_\_\_.

If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement. \_\_\_\_ - \_\_\_\_ - \_\_\_\_.

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

1. A predecessor or successor of a person convicted of a public entity crime; or
2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives' partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the proceeding 36 months shall be considered an affiliate.

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5. I understand that a "person" as defined in Paragraph 287.133 (1)(e), Florida Statutes, means any natural person or entity organized under the law of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.
6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement.

[Indicate which statement below applies.]

\_\_\_\_ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

\_\_\_\_ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

\_\_\_\_ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. [attach a copy of the final order]

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

\_\_\_\_\_  
[signature]

\_\_\_\_\_  
[date]

(OFFICIAL SEAL)

STATE OF \_\_\_\_\_ COUNTY OF \_\_\_\_\_.

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Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

by \_\_\_\_\_ who is personally known to me

or who has produced \_\_\_\_\_ as identification.

\_\_\_\_\_  
Signature of Notary Public

\_\_\_\_\_  
Typed, Printed or Stamped Name of Notary

\_\_\_\_\_  
My Commission Expires

\_\_\_\_\_  
Notary Public Commission Number

END OF SECTION 00 73 10

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SECTION 00 80 00  
MEASUREMENT, PAYMENT AND COMPLETION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This Section specifies The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.
- B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.
- C. The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The Owner/Engineer docs not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities Final payment will be made only for satisfactorily completed quantity of each item.
- D. No payment will be made for work constructed outside the authorized limits of work.
- E. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.
- F. Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum totals.

### 1.3 UNIT PRICE

- A. Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

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- F. No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the Owner until as-built (record) drawings have been submitted and approved by the Engineer.
1. Shop Drawings, Working Drawings.
  2. Clearing, grubbing and grading except as hereinafter specified.
  3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
  4. Dewatering and disposal of surplus water.
  5. Structural fill, backfill, and grading.
  6. Replacement of unpaved roadways, and shrubbery plots.
  7. Cleanup and miscellaneous work.
  8. Foundation and borrow materials, except as hereinafter specified.
  9. Testing and placing system in operation.
  10. Any material and equipment required to be installed and utilized for the tests.
  11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
  12. Maintaining the existing quality of service during construction.
  13. Maintaining or detouring of traffic.
  14. Appurtenant work as required for a complete and operable system.
  15. Seeding and hydromulching.
  16. As-built Record Drawings.

## 1.4 BID ITEM DESCRIPTIONS

- A. Bid Items are described in a greater detail below. Partial progress payments shall be submitted per our specifications.

**Bid Item No. 1: MOBILIZATION** MOBILIZATION/DEMOBILIZATION shall be paid for at a lump sum price. The contract lump sum price paid for MOBILIZATION/DEMOBILIZATION shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work in this category. MOBILIZATION shall include but not be limited to: obtaining bonds, insurance and financing, movement of equipment, materials and personnel, supervision, field office, certificates, permits, submittals, utilities, site maintenance, cleanup, dust control and all other work incidental to the contract per drawings and specifications. The cost for MOBILIZATION/DEMOBILIZATION shall not exceed five (5) percent of the total bid.

**Bid Item No. 2: TEMPORARY EROSION CONTROL** TEMPORARY EROSION CONTROL shall be paid for at a lump sum price. The contract lump sum price paid for TEMPORARY EROSION CONTROL shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required TEMPORARY EROSION CONTROL, including drainage inlet protection, fiber rolls, erosion control fencing, tree protection, construction entrances, and any other temporary erosion control measures as may be required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Architect.

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**Bid Item No. 3: SITE WORK - COMPLETE** Payment for all work under SITE WORK - COMPLETE shall be paid for at a lump sum price. The contract price paid for SITE WORK - COMPLETE shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in SITE WORK - COMPLETE. This sum shall be inclusive of entire project scope per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with SITE WORK - COMPLETE. Scope shall include but not be limited to: art walls, walkway canopy, backflow enclosure, pergolas, bike rack, median fence, fence, site concrete and asphalt, drainage and piping, site lights, FPL pole guy anchor and associated work with electrical connection modifications, and all other items not covered by bid item # 6. This section shall also include zero lot line construction excavation for art walls per specifications and demolition. See drawings and specifications for complete scope of work.

**Bid Item No. 4: ART WALL - SCREEN** Payment for all work under ART WALL - SCREEN shall be paid for at a lump sum price. The contract price paid for ART WALL - SCREEN shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in ART WALL - SCREEN. This sum shall be inclusive of entire project scope per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with ART WALL - SCREEN. Scope shall include but not be limited to: aluminum grating, all attachments for grating, insect screen, pipe shapes attached to grating, and all miscellaneous attachments for art wall structures. This bid item shall include all components and labor for metal screen attached to the back of the concrete art walls. See drawings and specifications for complete scope of work.

**Bid Item No. 5: LANDSCAPE AND IRRIGATION** Payment for all work under LANDSCAPE AND IRRIGATION shall be paid for at a lump sum price. The contract price paid for LANDSCAPE AND IRRIGATION shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in LANDSCAPE AND IRRIGATION. This sum shall be inclusive of entire project scope per plans and specifications for materials, installation/labor, storage, maintenance, testing and all other aspects of work associated with LANDSCAPE AND IRRIGATION. See drawings and specifications for complete scope of work.

**Bid Item No. 6: BUILDING - COMPLETE** Payment for all work under BUILDING - COMPLETE shall be paid for at a lump sum price. The contract price paid for BUILDING - COMPLETE shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in BUILDING - COMPLETE. This sum shall be inclusive of entire project scope per plans and specifications for material removal, labor, clean up, and all other aspects of work associated with BUILDING - COMPLETE. Scope shall include but not be limited to: all building systems and components as described in drawings and specifications, building signage, south pergola signage, bus shelters (5), and all zero lot line excavation components associated with this section. See drawings and specifications for complete scope of work.

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**Bid Item No. 7: ART ALLOWANCE** Payment for all work under ART ALLOWANCE shall be paid for at a lump sum price. The contract price paid for ART ALLOWANCE shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in ART ALLOWANCE. This sum shall be inclusive of entire scope per plans and specifications for material, manufacturing labor, delivery, storage of material, and all other aspects of work associated with ART ALLOWANCE. Scope shall include but not be limited to: material, artist design fee, and delivery. This bid item shall encompass all items necessary to successfully execute production and delivery of the art for the art walls. Owner and Architect have selected the artist and have negotiated artist fee. Contractor's installation cost, implementation of the contract with the selected artist, and general conditions associated with this bid item shall be priced in bid item #8. See drawings and specifications for complete scope of work.

**Bid Item No. 8: ART ALLOWANCE IMPLEMENTATION AND ASSOCIATED COST** Payment for all work under ART ALLOWANCE IMPLEMENTATION AND ASSOCIATED COST shall be paid for at a lump sum price. The contract price paid for ART ALLOWANCE IMPLEMENTATION AND ASSOCIATED COST shall include all work and materials per plans and specifications. Sum shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in ART ALLOWANCE IMPLEMENTATION AND ASSOCIATED COST. This sum shall be inclusive of entire scope per plans and specifications for material, labor, as built drawings, clean up, installation, and all other aspects of work associated with ART ALLOWANCE IMPLEMENTATION AND ASSOCIATED COST. Scope shall include but not be limited to: Contractor's overhead, general conditions, installation fee, management fee, and time associated with managing a contract with a selected artist. Contractor shall contract with the selected artist and complete the scope of work for ordering and installing of tile art per direction determined by the Owner and Architect. Commissioned art shall be translated into tile and ordered by the Contractor. Contractor shall manage the manufacturing process, install the product per manufacturer's specifications and Architects direction. See drawings and specifications for complete scope of work.

**Bid Item No. 9: DISCRETIONARY WORK** Payment for all work under DISCRETIONARY WORK shall be made only at the Owner's discretion in order to satisfactorily complete the project in accordance with the Plans and Specifications.

**Bid Item No. 10: HAZARDOUS MATERIAL REMOVAL** HAZARDOUS MATERIAL REMOVAL price shall be provided to the owner and shall not be part of the total bid price. This bid item is reserved to be used if any hazardous materials are discovered at the site and need to be mitigated in order to complete the Work per drawings and specifications. Contractor shall price 1 cubic yard or hazardous material removal and replacement of that material with a healthy material as needed to complete the Work as drawn and specified. Contractor shall price all work associated with removal and replacement of such material including but not limited to: all associated labor, equipment, transportation, healthy material replacement, and any associated price change in any work affected by this bid item as it pertains to completion of Work as drawn and specified. Contractor shall not add this price to the bid amount and shall use this unit price (CY) amount only if hazardous materials are discovered at the site. No work under this bid item shall be furnished without the written approval and agreement from the Owner. Contractor shall use this price for any (small or large) amount of work to be done under this bid item.

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## 1.5 APPLICATIONS FOR PAYMENT

- A. Applications for payment shall be made at approximately 30 day intervals in accordance with the dates established in the Standard Form of Agreement Between Owner and Contractor. At least 15 days before each progress payments falls due, the Contractor shall submit to the Architect, in quintuplet, an itemized Application for Payment, supported by such data sustaining the Contractor's right to payment as the Owner, or the Architect may require. The form of Application for Payment shall be AIA Document G702 - Application and Certification for Payment, supported by AIA Document G703 - Continuation Sheet. No other forms of Application for Payment will be acceptable. Continuation Sheet G703 shall be prepared the same as in the Schedule of Values submitted by the Contractor. Contractor's payment will be made within twenty-five (25) days after the Contractor's payment application is approved by the County.
- B. Contractor shall submit with each monthly Application for Payment, 1) an affidavit that payrolls, bills for materials and equipment, and other indeptness connected with the Work for which the previous Application, was submitted and the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, and 2) release or waivers of liens arising out of the Contract from each Subcontractor, materialmen, supplier, and laborer of the Contractor in the form of Partial Lien Waiver provided with the Contract Documents or such other form as may be approved by the Architect and Owner, and 3) County of Manatee Claims Form available from the city/county Clerk's office.
- C. For Schedule of Values requirements please see section 01 33 00.
- D. Unless otherwise indicated in Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site. If previously agreed upon by the Owner, payments may similarly be made for materials and equipment stored off the site at a location previously agreed upon in writing. Contractor shall comply with all conditions of off site storage agreement as indicated by the Owner prior to proceeding with arrangements for such conditions. Payment to Contractor for materials stored off site is discouraged. Where circumstances indicate that the Owner's best interest is served by off-site storage, the Contractor shall make written request to the Architect for approval to include such material costs in his next progress payment. The Contractor's request shall include the following information:
1. A list of the fabricated materials consigned to the project (which shall be clearly identified), giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.
  2. Certification that items have been tagged for delivery to the project and that they will not be used for another purpose.
  3. A letter from the Bonding Company indicating agreement to the arrangements and that payment to the Contractor shall not relieve either party or their responsibility to complete the facility.
  4. Evidence of adequate insurance covering the material in storage, which shall name the Owner as additionally insured.

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5. Costs incurred by the Architect to inspect material in off-site storage shall be paid by the Contractor.
  6. Subsequent pay requests shall itemize the materials and their cost which were approved on previous pay requests and remain in off-site storage
- E. The Contractor warrants the title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment and is free and clear of all liens and encumbrances. The Contractor will indemnify the Owner and the Owner's property from any liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors or their Sub-subcontractors, regardless of tier, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials, equipment, services or supplies relating to the Work, and from all cost and expenses, including attorneys' and consultants' fees incurred by the Owner in evaluating or defending against such liens, claims, security interests or encumbrances. Partial payments to the Contractor for labor performed under either a unit or lump sum price Contract shall be made at the rate of 90 percent (90%) of the Contract Sum.
- F. When the payment is made on account of materials or equipment not yet incorporated into the Project, such materials and equipment will become the property of the Owner; provided that if such materials or equipment are stolen, destroyed, or damaged before being fully incorporated into the Project, the Contractor will be required to replace them at its own expense, if not covered by builder's risk policy.
- G. A retainage of 2.5% of the total contract amount shall be withheld from payments after 75% completion of the Work. Upon substantial completion, this retainage shall be reduced to 1% of the total contract amount plus such amount as the Owner may reasonably deem necessary to repair, replace, complete or correct any damaged, defective, incorrect or incomplete work. Upon final acceptance, the remaining retainage shall be included in the final payment.

## 1.6 CERTIFICATES FOR PAYMENT

- A. The Architect will, within fifteen days, after receipt of the Contractor's Application for Payment, either issue to the owner a Certificate for Payment, with a copy to the Contractor, for such amounts as the Architect deems is properly due, or notify the Contractor and the Owner of the Architect's reason for withholding certification in whole or in part as provided in paragraph .1, section 3 of ARTICLE 6.
- B. The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment that to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated on the Application for Payment. The issuance of a Certificate for Payment will not be a representation that the Architect has (a) made exhaustive or continuous on site inspections to check the quality or quantity of the Work, (b) reviewed construction means, methods, techniques, sequences or procedures, (c) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (d) made examination to ascertain how or for what purpose the Contractor has used the money previously paid on account of the Contract Sum.

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## 1.7 DECISIONS TO WITHHOLD CERTIFICATION

- A. The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in Architect's opinion the representation to the Owner required by the above section can not be made. If an Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as indicated above. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in specifications and because of:
1. The Contractor is in default of the performance of any of its obligations under the Contract Documents, including, but not limited to: failure to provide sufficient skilled workers; work, including equipment or materials, which is defective or otherwise does not conform to the Contract Documents; failure to conform to the Project Time Schedule; or failure to follow the directions of or instructions from the Architect or Owner.
  2. The Contractor is in default of the performance of any of its obligations under another Contract, which it has with the Owner.
  3. The filing of the third party claims or reasonable evidence that third party claims have been or will be filed.
  4. The Work has not proceeded to the extent set forth in the Application for Payment.
  5. Representations made by the Contractor are untrue.
  6. The failure of the Contractor to make payments to its Subcontractors, materialmen, or laborers.
  7. Damage to the Owner's property or the property of another Contractor or person.
  8. The determination by the Architect that there is a substantial possibility that the Work cannot be completed for the unpaid balance of the Contract Sum.
  9. Liens filed or reasonable evidence indicating the probable filing of such liens with respect to the Project.
- B. When the above reasons for withholding certifications are removed, certification will be made for the amounts previously withheld. If the Owner makes payments by joint check, the Owner shall notify the Architect in order to reflect such payments on the next Certification for Payment.

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- C. Contractor's application for a payment shall reflect an equal percentage amount (within 2-3 percent) for labor and materials for Work completed. The Architect may adjust applications where labor exceeds materials or where materials exceed labor quantities in the Work completed columns.
- D. If the Contractor disputes a determination by the Architect with regard to Certificate of Payment, and during any related dispute resolution, litigation, or other proceeding, the Contractor nevertheless shall continue to execute the Work as described in the Contract Documents.

## 1.8 PROGRESS PAYMENTS

- A. After issuance of Certificate for Payment, Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall notify the Architect.
- B. The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall require each Subcontractor to make payments to Sub-subcontractors in a similar manner.
- C. The Owner has the right to request written evidence that the Contractor has paid all Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor. If the Contractor does not provide adequate evidence within seven days, Owner shall have the right to contact the Subcontractors and obtain the information required. Neither an Owner or Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law. Payments to material and equipment suppliers shall follow similar rules as stated above.
- D. A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work.

## 1.9 FAILURE OF PAYMENT

- A. If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within fourteen days after receipt, or if the Owner does not pay the contractor within fourteen days after the date established in the Contract the amount certified by the Architect the Contractor may upon fourteen additional days of written notice to the Owner and Architect stop the Work until payment of the owed amount is received. The Contract time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable cost of shut down, delay, start up, plus interest as provided for in the Contract.

## 1.10 SUBSTANTIAL COMPLETION

- A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract

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Documents and when all required occupancy permits, if any, have been issued so that the Owner can occupy or utilize the Work for its intended use.

- B. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work. The time fixed by the Architect for the completion of all items on the list accompanying the Certificate of Substantial Completion shall not be greater than 30 days. The Contractor shall complete items on the list within such 30 day period. If the Contractor fails to do so, the Owner in its discretion may perform the Work by itself or others and the cost thereof shall be charged against the Contractor. If more than one inspection by the Architect for the purpose of evaluating corrected work is required by the subject list of items to be completed or corrected, it will be performed at the Contractor's expense.
- C. Upon the receipt of the Contractor's list, the Architect will make an inspection and designate the Work qualified to be substantially complete. If any Work on the list or any additional Work required for utilization of the Work by the Owner is incomplete or not correct, the Contractor shall complete such Work before issuance of the Certificate of Substantial Completion. In such case the Contractor shall submit a request for another inspection by the Architect upon completion of the Work required for Substantial Completion.
- D. At the time the Architect commences the Substantial Completion Inspection, if the Architect discovers excessive additional items requiring completion or correction, the Architect may decline to continue the inspection, instructing the Contractor as to the general classification of deficiencies which must be corrected before the Architect will resume the Substantial Completion Inspection. If the Contractor fails to pursue the Work so as to make it ready for Substantial Completion Inspection in a timely fashion, the Architect shall, after notifying the Contractor, conduct inspections and develop a list of items to be completed or corrected. This list of items shall be furnished to the Contractor who shall proceed to correct such items within 7 days. The Architect will conduct additional inspections. The Architect will involve the Owner for 1) The cost of inspections between the termination of the initial Substantial Completion Inspection and the commencement of the satisfactory Substantial Completion Inspection, 2) The cost of inspection or review after the 7 day period established for the completion of the list by the Contractor. The Contractor shall reimburse the Owner for such cost, and the Owner may offset the amounts payable to the Architect for such services from the amounts due the Contractor under the Contract Documents.
- E. When the Work is designated portion thereof is substantially complete, the Architect shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the determine the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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- F. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon acceptance, the Owner shall make payment of retainage applying to such Work or designated portion thereof.
- G. The Contractor shall fully complete all Work under its Contract within thirty (30) days of receiving a Certificate of Substantial Completion with attached list of items required to be completed or corrected. Failure to do so may serve as cause for the Owner to declare the Contractor in default and terminate the Contractor pursuant to ARTICLE 10 of these Supplementary General Conditions.

## 1.11 PARTIAL OCCUPANCY OR USE

- A. Owner shall have an option for partial occupancy or use upon a written agreement between the Contractor and Owner to determine the responsibilities of each party. Partial occupancy does not constitute acceptance of Work not complying with the requirements of the Contract Documents.
- B. Immediately prior to such partial occupancy or use, Owner, Architect, and Contractor shall inspect the area to be occupied to record the conditions of the Work.
- C. Agreements as to the acceptance of the Work not complying with the requirements of the Contract Documents shall be in writing.

## 1.12 FINAL COMPLETION AND FINAL PAYMENT

- A. Upon receipt of Contractor's written notice that the Work is ready for final inspection and upon receipt of the final Application for Payment the Architect shall timely make such inspection determine if the Work is acceptable per Contract Documents. If the Work is acceptable, the Architect shall issue a final Certificate for Payment stating that to the Architect's best knowledge and presented information the work has been completed in accordance to the Contract Documents.
- B. Final payment and all remaining retainage shall become due only when the following items are submitted to the Architect:
  - 1. An Affidavit that all payrolls, bills for all items connected with the Work, and any other indebtedness have been paid (less amount owed by the final Payment and retainage withheld by the Owner).
  - 2. Evidence in writing or a certificate that the required insurance by the Contract Documents will not be canceled or that the insurance will not expire until at least thirty (30) days written notice has been given to the Owner.
  - 3. Written notice that the Contractor knows of no potential reasons that the insurance will not be renewable to fulfill the Contract Document requirements.

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4. Consent of surety to final payment.
  5. Any other documents, releases and waivers of liens, claims, receipts, copies of the expenditure, or any other items required by the Owner to assure no legal problems shall follow the Completion of the Contract. If a subcontractor refuses to furnish such a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unresolved for the Owner after the payments have been made, the Contractor shall refund the Owner all money associated with resolution of such lien including all costs and reasonable attorney's fees.
- C. The Contractor shall furnish such evidence as may be necessary to show that any out-of-state subcontractor or supplier has fully met the requirements of payment of taxes as established in any law of the State or local subdivision thereof which may be in effect at the time of final payment. The Owner will require the submission of such proof or evidence before final payment will be approved or made. The following must be submitted to the Architect before approval of final payment:
1. Affidavit of payment as required under this Paragraph shall be in the form of AIA Document G706 - Contractor's Affidavit of Payment of Debt and Claims.
  2. Release of liens as required under this Paragraph shall be in the form of AIA Documents G706A - Contractor's Affidavit of Release of Liens, or as may otherwise be reasonably requested or required to comply with Indiana law.
  3. Consent of Surety as required under this Paragraph shall be in the form of AIA Document G707 - Consent of Surety Company to Final Payment.
  4. Submit releases and final unconditional waivers of lien from major subcontractor and supplier.
  5. Submit certification stating that no materials containing asbestos were incorporated into the Work.
  6. Submit certification that all punch list items have been completed.
- D. If upon Substantial Completion final completion is delayed through no fault of the Contractor or by issuance of change orders adjusting/affecting the final completion date and if the Architect confirms the conditions be eligible for payment for Work completed without termination of the Contract. Final Payment, constituting the unpaid balance of the Contract Sum, shall be paid to the Contractor in full, including retainage, no less than 61 days following the date of Substantial Completion. If at that time there are remaining uncompleted items, an amount equal to 200 percent of the value of each item as determined by the Architect shall be withheld until said items are completed, and a Final Certificate of Payment issued by the Architect.
- E. Making of the final payment shall constitute a waiver of claims by the Owner except those arising from liens, claims, security interest, failure to comply with the Contract Documents or terms of special warranties.

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## 1.13 REQUEST FOR PAYMENT

- A. Submit Applications for Payment to the Project Manager or as directed at the pre-construction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.
- B. Submit payment requests in the form provided by the Owner with itemized data typed in accordance with the Bid Form .
- C. Provide construction photographs in accordance with Contract Documents.
- D. Submit Applications for Payment to the Project Manager or as directed at the pre-construction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.
- E. Submit three (3) copies of each application; all signed and certified by the Contractor. .

## 1.14 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information with a cover letter.
- B. Submit one copy of data and cover letter for each copy of application.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 00 80 00

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SECTION 00 80 10  
CHANGES IN THE WORK

## PART 1 - GENERAL

- 1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order ordering a minor change in the Work, subject to the limitations as may be stated elsewhere in the Contract Documents.
- 1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect.
- 1.3 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:
  - .1 The change in the Work;
  - .2 The amount of the adjustment, if any, in the Contract Sum; and
  - .3 The extent of the adjustment, if any, in the Contract Time.
- 1.4 Upon receipt of a Change Order, the Contractor shall promptly proceed with the change in the Work involved.
- 1.5 A Change Order signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately.
- 1.6 Unless otherwise provided elsewhere in the Contract Documents, costs for the purposes of Change Orders shall be limited to the following:
  - .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
  - .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
  - .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
  - .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
  - .5 Additional costs of supervision and field office personnel directly attributable to the change.
- 1.7 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.
- 1.8 The cost of the Contractors overhead and profit on any Change Order shall be:
  - .1 For extra Work completed by the Contractor with his own labor, 10 percent (10%) shall be added as the allowance for overhead and profit.
  - .2 For extra Work completed by Subcontractors of the Contractor, 10 percent (10%) shall be added as the allowance for overhead and profit.
  - .3 For Work deleted which would have been completed by Subcontractors of the Contractor,

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10 percent (10%) shall be credited to the Owner as the allowance for overhead and profit.

- .4 For Work deleted which would have been completed by Subcontractors of the Contractor, 5 percent (5%) shall be credited to the Owner by the Contractor as the allowance for overhead and profit."
- 1.9 When both additions and deletions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of net increase or decrease, if any.
- 1.10 In order to facilitate checking of quotations for extras or credits, proposals, (except those so minor that their propriety can be seen by inspection), shall be accompanied by a complete itemization of costs including labor, materials, and Subcontractors. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over \$500 be approved without such itemization. The Contractor shall submit same to the Architect within 14 days after receipt of proposal request.

END OF SECTION 00 80 10

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SECTION 00 80 50  
HAZARDOUS MATERIALS

## PART 1 - GENERAL

- 1.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.
- 1.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.
- 1.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described herein and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.
- 1.4 The Owner shall not be responsible for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.
- 1.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations, except to the extent that the cost and expense are due to the Owner's fault or negligence.

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- 1.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

END OF SECTION 00 80 50

# **Division 01**

## General Requirements



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SECTION 01 10 05  
GENERAL REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SCOPE AND INTENT

- A. Description: The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.
- B. Work Included
  - 1. The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.
  - 2. The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefor.
  - 3. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.
- C. Public Utility Installations and Structures
  - 1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.
  - 2. The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as approved by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

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3. Public utility installations or structures owned or controlled by the Owner or other governmental body, which are required by this contract to be removed, relocated, replaced or rebuilt by the Contractor not identified in any separate bid item shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefor.
4. Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the Engineer, for the contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.
5. The Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Sunshine State One-Call of Florida, Inc. Call Center ("Call Sunshine") and per all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).
6. The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

## 1.2 PLANS AND SPECIFICATIONS

- A. Plans: When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.
- B. Copies Furnished to Contractor: The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.
- C. Supplementary Drawings: When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.
- D. Contractor to Check Plans and Data: The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or

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omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

- E. Specifications: The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.
- F. Intent
  - 1. All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
  - 2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.
  - 3. The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

## 1.3 MATERIALS AND EQUIPMENT

- A. Manufacturer
  - 1. The names of proposed manufacturers, material men, suppliers and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.
  - 2. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
  - 3. Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, shall be made by the same manufacturer.
- B. Delivery: The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

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## C. Tools and Accessories

1. The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.
2. Spare parts shall be furnished as specified.
3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

## D. Installation of Equipment.

1. The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.
2. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.
3. The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.
4. The Contractor shall, at his own expense, furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.
5. Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy equal to Koppers 300M.

- E. Service of Manufacturer's Engineer: The Contract prices for equipment shall include the cost of furnishing (as required by equipment specifications sections) a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

## 1.4 INSPECTION AND TESTING

### A. General

1. Inspection and testing of materials will be performed by the Owner unless otherwise specified.

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2. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.
3. If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the Owner.
4. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.
5. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

## B. Costs

1. All inspection and testing of materials furnished under this Contract will be performed by the Owner or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.
2. The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.
3. Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests on materials and equipment which are rejected for non-compliance.

C. Inspections of Materials: The Contractor shall give notice in writing to the Engineer, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture: When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

## E. Shop Tests of Operating Equipment

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1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.
  2. Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.
  3. The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.
- F. Preliminary Field Tests: As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacements required. The furnishing Contractor shall assist in the preliminary field tests as applicable.
- G. Final Field Tests
1. Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.
  2. The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the Owner. The Supplier shall assist in the final field tests as applicable.
- H. Failure of Tests
1. Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the Owner, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.
  2. In case the Owner rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the Owner may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.
- I. Final Inspection: During such final inspections, the work shall be clean and free from water. In no case will the final pay application be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

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## 1.5 TEMPORARY STRUCTURES

- A. Temporary Fences: If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

## 1.6 TEMPORARY SERVICES

- A. First Aid: The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

## 1.7 LINES AND GRADES

- A. Grade: All work under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the Owner/Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
- B. Safeguarding Marks
  - 1. The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or removing without authorization such established points, stakes and marks.
  - 2. The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.
- C. Datum Plane: All elevations indicated or specified refer to the Mean Sea Level Datum of the NGVD 1929 Datum and/or NAVD 1988.

## 1.8 ADJACENT STRUCTURES AND LANDSCAPING

- A. Responsibility
  - 1. The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the Engineer, additional work is

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deemed necessary to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

2. Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.
3. Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the Owner and to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.
4. Prior to the beginning of any excavations, the Contractor shall advise the Engineer of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

## B. Protection of Trees

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. If so ordered, the Owner will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas: Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Workmanship and Materials Paragraph in Section 02485, Seeding & Sodding.

D. Restoration of Fences: Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefore, as part of the overhead cost of the work, and no additional payment will be made therefore.

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## 1.9 PROTECTION OF WORK AND PUBLIC

- A. Barriers and Lights: During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.
- B. Smoke Prevention: A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.
- C. Noise
  - 1. Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all engines or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.
  - 2. Except in the event of an emergency, no work shall be done between the hours of 7:00 P.M. and 7:00 A.M., or on weekends. If the proper and efficient prosecution of the work requires operations during the night or weekends, the written permission of the Owner shall be obtained before starting such items of the work.
- D. Access to Public Services: Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.
- E. Dust prevention: The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

## 1.10 CUTTING AND PATCHING

- A. The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.
- B. Refer to Section 01 10 45 for provisions on this subject.

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## 1.11 CLEANING

- A. During Construction: During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.
- B. Final Cleaning
  - 1. At the conclusion of the work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.
  - 2. The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

## 1.12 MISCELLANEOUS

- A. Protection Against Siltation and Bank Erosion
  - 1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
  - 2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the Engineer which results from his construction operations.
- B. Protection of Wetland Areas: The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection or Southwest Florida Water Management District.
- C. Existing Facilities: The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.
- D. Use of Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 10 05

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SECTION 01 11 00  
SUMMARY OF WORK

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to Work of this Section.

### 1.2 PROJECT DESCRIPTION

- A. The Project consists of construction of a single story ticket building, roughly 500sf, as shown on Contract Documents prepared by **SCHENKELSHULTZ**, dated November 12th, 2010.
- B. The Work consists of building a CMU building and redevelopment of an entire city block street to accommodate new bus transit station. Besides the ticket building, scope shall include art walls, median, median fence, pergolas, bus canopies and outdoor seating for passengers. Scope of work also shall include zero lot line construction for the building and art walls.
  - 1. The Work includes concrete, masonry walls, structural steel, precast double t shapes, metal roof, architectural woodwork, waterproofing, insulated roofing, roof accessories, sheet metal, overhead security doors, hollow metal doors and frames, hollow metal windows, aluminum doors and windows, hardware, glazing, interior finishes and furnishings including vertical blinds, heating-ventilating-air conditioning, electrical systems, lighting, and plumbing.
  - 2. Interior finishing and related construction, including interior partitions and permanent doors, counters, transaction window, hand sink, exterior steel painting and protection, life safety devices, toilet accessories, and fire extinguishers.
  - 3. The Work shall include allowance for tile art per specifications.
- C. The Work consists of all items as indicated on the Drawings and as specified in the Project Manual and those items of construction not indicated but normal and necessary and usual in the construction industry for construction of a building project.

### 1.3 WORK UNDER SINGLE CONTRACT

- A. The intent of this Section to indicate the Work required by the Contractors and to provide information regarding the duties, responsibilities, and cooperation required by the Contractors, with similar requirements for the subcontractors and suppliers.
- B. Prime Contracts are defined to include the following contract described in the Schedule of Contract Responsibilities; and each is recognized to be a major part of project, with Work to be performed concurrently and in close coordination with Work of other Prime Contracts.

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- C. The "Contract Documents," as defined in the General Conditions, include "the Drawings." Although Drawings are grouped and identified by classification of the Work, Contractors shall be responsible for their Work as specified herein and as indicated on the Drawings. Although the majority of the Drawings are "to scale," Contractors are directed to use indicated dimensions for determining material quantities and for other reasons. No additional monies will be allowed due to Contractors using "scale instruments" to determine material quantities or for other reasons.
- D. A single contract will be awarded as per the attached "Schedule of Contract Responsibilities" in this Section. Contractors shall include Work required by the Specifications and Drawings for each contract area defined in the Schedule.
- E. Work for the complete construction of the Project will be under a single contract with the Owner.

## 1.4 WORK SEQUENCE

- A. The Work will be conducted in phases to provide the least possible interference to the activities of the Owner's personnel and to permit an orderly transfer of personnel and equipment to the new facilities.

## 1.5 ADMINISTRATIVE RESPONSIBILITIES OF PRIME CONTRACTOR

- A. The General Contractor shall be responsible for the maintenance of the Construction Schedule and the general supervision of every phase of the Work.
  - 1. Requirements for a specific trade of contract will generally be described in that portion of the Specifications or Drawings related to that trade or contract. Such requirements may, however, be described in other Sections of the Contract Documents. Contractors will be held responsible for having carefully examined all Drawings and read all Divisions of the Specifications and all Contract Documents, to avoid omissions or duplications, and to ensure a complete job.
  - 2. Each Contractor must be fully informed about conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a Contractor of his obligation to furnish all material and labor necessary to carry out the provisions of his Contract.
  - 3. Contractors shall cooperate with the General Contractor in notifying him when the Work is at a stage to require the services of other contractors and shall notify the General Contractor in the event that such other Contractors do not carry out their responsibilities in connection with such notification.
- B. Contractors shall cooperate with and assist the General Contractor in the preparation of construction progress and procedures, schedule of product deliveries, and their effect on the overall project progress and completion. Other Contractors shall cooperate in getting their Work and the Work of their subcontractors completed according to the schedule as prepared and maintained by the General Contractor. Each Contractor shall immediately

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notify the General Contractor of a delay in delivery of products or the scheduled date of completion that may affect the total progress of construction.

- C. The Owner will furnish the topographical survey, either as a part of these Drawings or separately, giving the general topographical lines existing at the site and the property lines.
- D. Contractors required to make connections to existing utilities, especially sewerage where gravity flow occurs, shall verify grades and locations at points of such connections and shall notify the Architect of circumstances which would adversely affect the proper flow or connection to such facilities.

## 1.6 CONTRACTOR USE OF PREMISES

- A. General: During the construction period the Contractors shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.
- B. Limit use of the premises to construction activities in areas indicated or as directed by the Project Manager or Owner's authorized representative.
  - 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
  - 2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
  - 3. Burial of Waste Materials: Prior to final grading and landscape development, the existing grade depression near the southwest corner of the site, as indicated, may be used for disposal of inert waste material from the construction process. Do not dispose of organic and hazardous material on site, either by burial or by burning.
- C. Use of the Existing Building/Property: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.
- D. Each Contractor shall limit his use of the premises for work and for storage, to allow for work by other Contractors and Owner occupancy of adjacent buildings or building areas.
- E. Coordinate use of the premises, under direction of the General Contractor.
- F. Each Contractor shall assume complete responsibility for the protection and safekeeping of products under this Contract, stored on the site.
- G. Each Contractor shall move his stored products which interfere with operation of the Owner or separate Contractor.

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- H. Each Contractor shall obtain and pay for the use of additional storage of work areas needed for operation.

## 1.7 OWNER OCCUPANCY

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.
- B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
  - 1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.
  - 2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
  - 3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

## 1.8 PRE-ORDERED PRODUCTS

- A. General: If the Owner has negotiated purchase orders with suppliers of material and equipment to be incorporated into the Work. These purchase orders are assigned to the Contractor and costs for receiving, handling, storage, if required, and installation are included in the Contract Sum.
  - 1. The Contractor's responsibilities are the same as if the Contractor negotiated purchase orders, including responsibility to renegotiate purchase if necessary and to execute final purchase order agreements.

## 1.9 OWNER-FURNISHED ITEMS/WORK BY OWNER

- A. The Owner will provide furniture for office areas and fabrication equipment for production processes. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
  - 1. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.
  - 2. If Owner-furnished items are damaged, defective or missing, the Owner will arrange for replacement. The Owner will also arrange for manufacturer's field services, and the delivery of manufacturer's warranties and bonds to the Contractor.

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3. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.
- B. The Owner intends to complete the following items of Work outside the provisions of these Contract Documents. Contractors shall not restrict or interfere with the Owner's right to the Project to accomplish this Work.
1. Equipment and furniture except as scheduled and specified under Divisions 11 and 12 and shown on the Drawings.
  2. Other such items which may be deleted from Contractors for Work as required by the Contract Documents.
  3. The purchase and supplying of certain materials as noted in the Project Manual.

## 1.40 GRADES, LINES, LEVELS

- A. Information pertaining to preliminary investigations, such as test borings, location of utilities, existing structures, and existing grades appear in the Project Manual or on the Drawings. While such data has been collected with reasonable care, there is no expressed or implied guarantee that conditions so indicated are entirely representative of those actually existing or that unforeseen developments may not occur. The Contractor must put his own interpretation on results of such investigation and shall satisfy himself as to materials to be excavated and materials upon which fill or other work may be placed. Where underground services, utilities, structures, etc., are located on the Drawings or given at the site, they are based on available records, but are not guaranteed to be complete or correct. They are merely given to assist each Contractor.
- B. The General Contractor shall immediately, upon entering the site for the purpose of beginning work, locate general reference points and take such action as is necessary to prevent their destruction. The Contractor shall lay out his own work and be responsible for all lines, elevations, and measurements of the building, utilities, and other work executed by him under the Contract. He must exercise proper precaution to verify figures on the Drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.
- C. Using datum furnished by the Owner, the lot lines and present levels have been established as shown on the Site Plan. Other grades, lines levels, and bench marks shall be established and maintained by the Contractors who shall be responsible for them.
- D. Each Contractor shall provide required stake-out and grade staking for all work from reference points provided. Each Contractor shall establish all grades, lines, levels, and elevations required for his work from on-site reference points.
- E. Each Contractor shall make provision to preserve property line stakes, bench marks, or datum point. If any are lost, displaced, or disturbed through neglect of any other Contractor or Subcontractor, Contractor causing damage shall pay for the cost of restoration.
- F. Each Contractor, as it applies to his contract, shall verify grades, lines, levels, locations,

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and dimensions as shown on Drawings, and report any errors or inconsistencies to the Architect before commencing work. Starting of work by the Contractor shall signify his acceptance.

## 1.51 TAXES

- A. Taxes which the Contractor must pay which are legally enacted at the time bids are received, whether or not effective, shall be paid by the Contractor.

## 1.62 PERMITS, FEES, AND NOTICES

- A. The General Contractor will secure the general building permit for the Owner. Each Contractor shall secure and pay for other permits, governmental fees, and licenses necessary for the proper execution and completion of his Work, which are applicable at the time the bids are also received. Fees to relocate utilities on Owner's property shall be included in the bid of the Contractor doing the relocation. Each Contractor shall be responsible for contacting the local governing agency for such cost information and requirements.
- B. Utility Tie-Ins: Shall be arranged with local utility company and other involved parties for minimum interruption of service.
- C. Inspections of installed work shall be performed by the governing authority as arranged for by the Contractor. Work shall not be covered until approved.
- D. Each Contractor shall give notices and comply with laws, ordinances, rules, regulations, and orders of public authorities bearing on the performance of his Work. If a Contractor observes that the Contract Documents are at variance therewith, he shall promptly notify the Architect in writing, and necessary changes shall be adjusted by appropriate notification. If a Contractor performs Work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to the Architect, he shall assume full responsibility therefore and shall bear the costs attributable thereto.

## 1.13 LABOR AND MATERIALS

- A. Unless otherwise specifically noted, each Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of his Work, whether temporary or permanent and whether or not incorporated or to be incorporated at the Work.
- B. Each Contractor shall enforce strict discipline and good working order among his employees or other persons carrying out Work of his Contract and shall not permit employment of unfit person or persons or anyone not skilled in the task assigned to them.

## 1.74 CUTTING AND PATCHING UNDER SEPARATE CONTRACTS

- A. Refer to Section 01 73 29 for provisions on this subject.

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## 1.15 PROJECT MANAGEMENT

- A. The bid package contractor shall provide full-time, on site a competent Project Coordinator and a Superintendent approved by the Owner to coordinate all aspects of his work with the Project Manager, Owner and Designer and other Bid Package Contractors' work. It shall be the full responsibility of the Bid Package Contractor and each subcontractor to coordinate all aspects of construction with all phases of Architectural, Structural, Mechanical (including Plumbing, Heating Ventilation and Sheet Metal Trades), Electrical Work, Site Work, and other Bid Package Work. All subcontractors shall fully cooperate with each other, the Bid Package Contractor, Project Manager, Owner and Designer.
  - 1. The Bid Package Contractor shall provide a full-time, on-site, Project Coordinator, whose responsibilities include, but are not limited to, full coordination of all Bid Package Work. The Project Coordinator's position shall be for coordination purposes only, and shall not be for any other purpose. The Superintendent shall represent the bid package contractor.
  - 2. The Project Coordinator of all Bid Packages must attend all scheduled meetings required by the Owner, Designer or Project Manager.
- B. The Bid Package Contractor shall coordinate the performance of his subcontractors in the utilization of the site, as well as in the actual performance of their contractual obligations.
- C. The Bid Package Contractor shall verify all dimensions shown on the Drawings and obtain all measurements required for proper execution of Work.

## 1.16 PROJECT COORDINATION

- A. Each Contractor shall provide full-time, on-site supervision including a competent project coordinator and competent Superintendent to coordinate all aspects of his Work with other Contractors' Work. It shall be the full responsibility with all phases of Architectural, Structural, Mechanical (including Plumbing, Heating, Ventilation, and Sheet Metal Trades), Electrical Work, Site Work, Special Equipment, Kitchen Equipment, and other separate Contract Work. All Separate Contractors shall fully cooperate with each other and the Architect.
- B. Each Contractor shall coordinate the performance of his subcontractors in the utilization of the site, as well as in the actual performance of their contractual obligations to the Owner.
- C. Each Contractor shall cooperate with the General Contractor and all other Contractors employed by the Owner.
- D. Each Contractor shall verify all dimensions shown on the Drawings and obtain all measurements required for proper execution of Work.
- E. Each Contractor shall see that sleeves and inserts for pipes, conduits, and similar items shall be correctly placed and kept in their proper positions in forms, walls, partitions, and floors, and not displaced by the placing of concrete or other construction work. All items shall be placed in ample time so as not to delay concrete operations or other work. Do not place sleeves so they pass vertically through beams, girders, and similar construction,

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unless locations are approved by the Architect. Locations of chases are indicated in the mechanical and electrical drawings. The separate Contractor and/or Subcontractor of the Work involved shall be responsible for inclusion of these items in the work, and shall advise the Contractor and Architect of all required changes.

- F. Before commencing work, each Contractor shall examine all spaces, surfaces, and areas indicated on the Drawings to receive their Work. Report necessary corrections in writing immediately to the General Contractor and the Architect. Do not proceed until corrections (if any required) have been made. Commencing work signifies this Contractor's acceptance of said spaces, surfaces, and areas, and of job conditions.
- G. Special Equipment, Other Equipment
  - 1. Copies of Equipment Specifications and Drawings shall be made available to the Architectural Trade Contractors, Mechanical Contractor, and Electrical Contractor for information by which they shall determine the amount of Work to be done as described herein.
  - 2. As the building project nears completion, certain rooms may be made ready to accept the equipment intended for them.
  - 3. The Contractor shall cooperate with the suppliers' installation personnel by providing unobstructed areas in which they may assemble and install equipment. These areas shall be adequately heated and lighted with temporary or permanent power available for tools or testing purposes.
  - 4. The responsibilities of the Electrical and Mechanical Work Contractors shall be as follows:
    - a. Final connections of equipment to building electrical and mechanical rough-ins will be made by the Electrical and Mechanical Work Contractors (interconnection between items of equipment will be done by the installing personnel, not by the Electrical or Mechanical Work Contractors). Equipment requiring only plug-in connections shall have floor outlets installed in accordance with these documents.
- H. Temporary Omission of Work
  - 1. If any materials and finish are of such nature that it is necessary to temporarily omit certain portions of work (as illustrated on Drawings or specified in Specifications) in order to make final installation, the Contractor whose work is involved shall omit such parts of this work or finish as necessary until other said work and/or materials have been installed and shall then return and install such omitted parts of his work as part of this Contract and without additional cost to the Owner.

## 1.17 TESTS AND ADJUSTMENTS

- A. If the Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested, or approved, the contractor shall give the Architect 48 hours advance notice so he may observe such inspection, testing, or approval. The Contractor shall bear all costs of such inspections, tests, or approvals conducted by or for public authorities.

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- B. The complete installation of piping, wiring, and working components, including all operating equipment and systems, shall be subjected to test at full operating conditions. The Contractor shall make all necessary adjustments and/or replacements which are necessary to fulfill the requirements of the Contract Documents, and to comply with all codes and regulations which may apply to the entire installation. The complete installation shall be left ready in all respects for use by the Owner. The Contractor shall bear all costs of such testing and adjustments.
- C. Unless otherwise provided, the Owner shall bear all costs of other inspections, tests, and approvals.
  - 1. The Bid Package Contractor shall bear all costs for scheduled pick ups or tests if the Testing agency makes a trip to the site and material or work is not ready for pick up or tests.

## 1.18 VERIFICATIONS OF EXISTING DIMENSIONS

- A. When verification of existing dimensions is required, the Contractor requiring said verification for the construction or fabrication of his material shall be the Contractor responsible for procurement of the field information.

## 1.19 PROJECT SECURITY

- A. The General Contractor shall be responsible for developing and conducting a security program, specifically oriented for the protection of preventing damage, injury, or loss to the entire project site and other property at the site or adjacent thereto. This shall be acceptable to the Owner and Architect, and shall remain in effect through Substantial Completion of the Project.
- B. Each Contractor shall be responsible for securing his work and equipment at the close of each workday.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 SCHEDULE OF CONTRACT RESPONSIBILITIES

- A. Scope
  - 1. Contractors shall submit their proposals abased on the Work included under each contract area as listed herein. Include Work necessary for a complete project, as shown on the Drawings and called for in the Specifications.

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2. Questions concerning the phasing or "Schedule of Contract Responsibilities" should be directed to the General Contractor, who will be the interpreter and be responsible for this Schedule of Contract Responsibilities and Contract Breakdown, prior to submitting proposals and during construction.
3. The requirements of Division 1 are a part of the Work if each and every contract area. The Contractor for any one contract area shall be familiar with the Work and requirements of all other contract areas.
4. Certain Specification Sections describe Work to be performed under several contract areas. Provide Work of this nature are required for each contract area whether or not enumerated in the Schedule of Contract Responsibilities.
5. The following contract areas are broken down by Specifications Section conforming basically to the CSI format.
6. The Drawings and Specifications as furnished for each of the Contracts is for the convenience of the Contractor in preparing a proposal for this Project. However, each Contractor is responsible to review the complete set of Drawings and Specifications to assure that Work required to be installed to complete his phase of the Work is included in his proposal. This "Schedule of Contract Responsibilities" is a definition of the work as it is to be bid, but is normally inherent to a trade, or is included in the scope of the applicable technical revision, (it will be the responsibility of that Contractor to include the Work in his proposal.
7. This "Schedule of Contract Responsibilities" is to aid each Contractor defining the Scope of Work to be included in his proposal. However, omissions from this "Schedule of Responsibilities" do not relieve the Contractor from including in his proposal that Work which will be required to complete his Contract. Each Contractor should read the "Schedule of Contract Responsibilities" completely to familiarize himself with the Work of other Contractors that may have Work in adjacent areas and to coordinate the interfacing problems that may occur as the work is assembled and constructed.
8. Where specific Work is to be completed under a particular phase of the Project and the Work is wholly or partially completed by other trades because of the type of work involved or jurisdictional trade agreements, the Contractor will be responsible to subcontract the Work as necessary to complete the Work included in his Contract. No delay in the Work will be allowed due to the failure of the Contractor to subcontract related work required by jurisdictional trade agreements.

## B. Coordination of Work

1. Each Contractor is responsible to coordinate his Work of other trades and other Contractors and requirements of the school system. The Contractor must make space allowance for Work of other Contractors; provide necessary openings where indicated or implied by the Drawings and Specifications. Each Contractor is responsible to protect his own Work.

END OF SECTION 01 11 00

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SECTION 01 21 00  
ALLOWANCES

## PART 1 - GENERAL

### 1.1 ALLOWANCES FOR WORK

- A. Provide Work under allowance only as directed by Architect and pursuant to Change Order executed in accordance with the Contract Documents.
- B. Include following amounts in bid for inclusion in Contract sum:
  - 1. Allowance to contract with artist for art work
    - a. Base Bid
    - Artist Contract .....\$ 160,000.00
- C. Amount of Allowance includes:
  - 1. Net cost of product.
  - 2. Delivery to the site.
  - 3. Applicable taxes.
  - 4. Handling at site including unloading, uncrating, and storage.
  - 5. Protection from elements, from damage.

### 1.2 DELIVERY

- A. Contractor Responsibility:
  - 1. Arrange for delivery and unloading.
  - 2. Promptly inspect product for damage or defects.
  - 3. Submit claims for transportation damage.

## PART 2 - PRODUCTS

Not Applicable

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Provide all items and accessories as required for a complete installation in every respect.

END OF SECTION 01 21 00

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## SECTION 01 26 13 REQUESTS FOR INFORMATION (RFI) PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section specifies Requests for Information (RFI) procedures.

#### 1.2 DEFINITIONS

- A. Drawing/Plan Clarification: An answer from the Architect, on behalf of the Owner, in response to an inquiry from the contractor, intended to make some requirement(s) of the drawings or plans clearly understood. Drawing/plan clarifications may be sketches, drawings, or in narrative form and will not change any requirements of the drawings or plans. Responses to contractor inquiries shall be as outlined in "Requests for Information" as specified herein.
- B. Non-Conformance Notice: A notice issued by the Architect, on behalf of the Owner, documenting that the Work or some portion thereof has not been performed in accordance with the requirements of the Contract Documents. Payment shall not be made on any portion of the Work for which a Non-Conformance Notice has been issued and the Work not corrected to the satisfaction of the Architect and Owner.
1. Upon receipt of a Non-Conformance Notice, the Contractor shall provide a written Response to Non-Conformance Notice within five (5) working days after receipt of the Notice. The contractor's response shall detail either (a) why they believe that the work was performed in accordance with the contract documents or (b) what corrective action they intend to take, at their sole expense, to correct the non-conforming work.
  2. If the Contractor disputes the issuance of the Non-Conforming Notice, the Construction Manager or Architect, on behalf of the Owner, has five (5) working days to respond by either (a) withdrawing the Non-Conformance Notice or (b) directing the Contractor to correct such Work. Such determination by the Construction Manager or Architect, on behalf of the Owner, shall be final and conclusive.
  3. If directed to correct the Work, the Contractor shall do so within five (5) working days after receipt of such direction from the Construction Manager or Architect, on behalf of the Owner, or such other time as may be agreed to.
- C. Project Communications: Routine written communications between the Architect, Owner, and Contractor which are in letter, field memo, or fax format. Such communications shall not be identified as Requests for Information nor shall they substitute for any other written requirement pursuant to the provisions of these Contract Documents.
- D. Requests for Information: A request from the Contractor or one of its subcontractors, to the Architect, on behalf of the Owner, seeking an interpretation or a clarification of some requirement of the Contract Documents. The contractor shall clearly and concisely set forth the issue for which it seeks clarification or interpretation and why a response is needed. The contractor shall, in the written request, set forth its interpretation or understanding of the contract's requirements along with reasons why it has reached such an understanding.

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1. Responses from the Architect, on behalf of the Owner, will not change any requirements of the Contract Documents. Responses to RFI's will be as further defined herein.

## 1.3 REQUESTS FOR INFORMATION

- A. In the event the contractor or subcontractor, at any tier, determines that some portion of the drawings, specifications, or other contract documents requires clarification or interpretation, the contractor shall submit a Request for Information in writing. Requests for Information shall only be submitted by the Prime Contractor and shall only be submitted on the Request for Information form provided.
  1. The contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the Request for Information, the contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.
- B. The Architect, on behalf of the Owner, will review all Requests for Information to determine whether they are Requests for Information as defined in the Contract Documents. If it is determined that the document is not an RFI, it will be returned to the contractor, unreviewed as to content, for resubmittal on the proper form in the proper manner.
- C. Responses to Requests for Information shall be issued within five (5) working days of receipt of the request from the contractor, unless the Architect determines that a longer time is needed to provide an adequate response. If a longer time is deemed necessary by the Architect, then the Architect shall, within five (5) working days of the receipt of the request, notify the contractor of the anticipated response time.
  1. If the contractor submits a Request for Information on an activity with five (5) working days or less of float on the current project schedule, the contractor shall not be entitled to any time extension due to the time it takes the Architect, on behalf of the Owner, to respond to the request provided that the Architect responds within the five (5) working days set forth above.
- D. Responses from the Architect, on behalf of the Owner, will not change any requirements of the Contract Documents. In the event that the contractor believes the response to a Request for Information will cause a change to the requirements of the Contract Documents, the contractor shall immediately give written notice that the contractor considers the response to be a Change Order. Failure to give such written notice immediately shall waive the contractor's right to seek additional time or cost under the provisions set forth in the General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 26 13

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SECTION 01 26 14  
PROPOSAL REQUEST (PR) PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This section includes administration and procedural requirements for proposal requests.
- B. Measurement and payment criteria applicable to work required.

### 1.2 DEFINITION

- A. A Proposal Request is a written direction in the form of an AIA Document from the Architect, Contractor and Owner used to document changes in Scope of work and to identify the cost impact of the change.

### 1.3 CAUSE FOR PROPOSAL REQUESTS

- A. Changes in Scope of work may be affected by:
  - 1. As a result of Design Changes that are cost related changes in order to complete or enhance the scope of the change in question and results in added value to the Owner.
  - 2. As an Owner requested change that is a cost related change in scope that is initiated by the Owner.
  - 3. As a unforeseen change that is a cost related change in scope that is most generally related to existing site conditions or existing facility that could not have been known at Bid time and clearly unidentifiable.
  - 4. As a value engineering change that is a cost related change that after identifying or solving techniques the required function at the lowest or lower cost achieved.
  - 5. As a construction change that is a cost related change that is closely related to a design change but is brought to the attention of the Architect due to installation means and method or construction clarification.

### 1.4 PROCEDURES

- A. The Architect shall issue written direction through a Proposal Request (AIA Document G-709) which will include detailed information, drawings or sketches and changes in scope of work to the Contract Document.
- B. The Contractor shall review the Proposal Request and submit their cost Proposal for the cost related changes.

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1. Contractor shall indicate if the cost is an add to or deduct from the Contract Sum. Proposal requests may be issued for deduct cost items as well.
- C. The Contractor shall submit their cost proposal within ten (10) working days or state in writing when the Proposal will be returned based on the given circumstances. Each proposal shall include a material and labor breakdown for all work performed by their own forces, or subcontractor's forces. Any supporting time sheets for time and material work and subcontractors cost proposals shall be included in the Prime Contractors' Proposal. All of these items shall be included in deduct proposal requests as well.
- D. Each Proposal issued by the Contractor shall specifically address any required additional or deducted contract time. If no mention is made it is assumed that none is required. No consideration of additional time will be given for previously approved Proposals without specific written approval from the Owner or Architect.
- E. The maximum aggregate increased cost for combined overhead and profit shall be as noted in the Owner's requirements. This combined overhead and profit as specified shall be used in deduct proposal requests as well.
- F. The value of any scope of work change shall be determined by mutual acceptance of a lump sum, by unit prices or by time and material basis not to exceed plus the appropriate mark-up.
- G. The Architect shall review the contractors cost proposal and provide a recommendation to the Owner.
- H. The Owner reserves the right to reject the contractors cost proposal associated with the Proposal Request.
- I. The Owner shall review the recommendations of the Architect and if appropriate approve the contractors cost proposal. A memorandum shall be issued to the contractor notifying the contractor of approval with any clarifications.
- J. The approved Proposal Request shall become a part of the contract documentation when issued in a Change Order. The Owner reserves the right to include multiple Proposal Requests in one Change Order.
- K. For payment purposes, the Contractor may list each Change Order by number with a listing of each Proposal Request on the schedule of values submitted with each Pay Application. The Owner will pay for approved percentages of each Proposal Request until completed.
- L. The Contractor shall carry out the scope of work changes after notification of approval. Work related to the Proposal Request shall be carried out within a reasonable time in order to not delay other work or to cause increased cost because of other work. The Contractor shall have ten (10) working days in which to respond to Proposal Request or to notify the Architect in writing of the date on which the Proposal is anticipated. These requirements apply to deduct proposal requests as well.

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- M. If the contractor fails to respond to the Proposal Request or notify the Architect within (10) calendar days, this lack of action shall be construed as no additional cost for the Proposal Request.
- N. If the contractor's cost proposal is rejected by the Architect, all parties shall review the scope of work and cost proposal and agree to an acceptable cost.
- O. If the Contractor and Architect can not come to an agreement on an acceptable cost, the Contractor may be directed to proceed with the scope of work changes on a time and material basis not to exceed the Contractor's cost Proposal. The Contractor shall be required to submit daily time sheets for the Architect to review and approve. The Owner shall review and approve the final costs upon recommendation of the Architect.

## 1.5 CHANGE ORDERS

- A. The Architect shall assemble the Change Order by Proposal Request or by grouping a number of Proposal Requests.
- B. Two original copies of the Change Order shall be printed for signatures. Upon completion of the signature process an original copy will be forwarded to the Contractor.
- C. The Contractor shall provide a new non-collusion affidavit with the return of the Change Order after signing.
- D. Payment for the Change Order will be possible after signatures are obtained from the Architect, the Contractor and the Owner and upon acceptance by the Owner.

## 1.6 AS-BUILT DOCUMENTATION

- A. It is imperative that the Contractor update their as-built documents in the field for each and every Proposal Request that changes the content of the Document. The Owner reserves the right to inspect the Contractor's as-built document prior to each Pay Application. The status of the Contractors as-builts may result in withheld payment for that portion of the work.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 26 14

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SECTION 01 31 13  
PROJECT COORDINATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to the Work of this Section.

### 1.2 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
  - 1. Coordination.
  - 2. Administrative and supervisory personnel.
  - 3. General installation provisions.
  - 4. Cleaning and protection.
- B. Progress meetings, coordination meetings and pre-installation conferences are included in Section 01 31 19, Project Meetings.
- C. Requirements for the Contractor's Construction Schedule are included in Section 01 33 00, Submittals.

### 1.3 COORDINATION

- A. Coordination: The General Contractor shall coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
  - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
  - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
  - 1. Prepare similar memoranda for the Owner and separate contractors and subcontractors where coordination of their Work is required.

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- C. Administrative Procedures: The General Contractor shall coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of schedules.
  - 2. Installation and removal of temporary facilities.
  - 3. Delivery and processing of submittals.
  - 4. Progress meetings.
  - 5. Project Close-out activities.
  
- D. Conservation: The General Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

## 1.4 SUBMITTALS

- A. Coordination Drawings: The General Contractor shall prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
  - 1. Show the interrelationship of components shown on separate Shop Drawings.
  - 2. Indicate required installation sequences.
  - 3. Comply with requirements contained in Section 01 33 00, Submittals.
  
- B. Staff Names: Within 15 days of Notice to Proceed, submit a list of the contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
  - 1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

## PART 2 - PRODUCTS (NOT USED)

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## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

### 3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

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- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Thermal shock.
  5. Excessively high or low humidity.
  6. Air contamination or pollution.
  7. Water or ice.
  8. Solvents.
  9. Chemicals.
  10. Light.
  11. Radiation.
  12. Puncture.
  13. Abrasion.
  14. Heavy traffic.
  15. Soiling, staining and corrosion.
  16. Bacteria.
  17. Rodent and insect infestation.
  18. Combustion.
  19. Electrical current.
  20. High speed operation,
  21. Improper lubrication,
  22. Unusual wear or other misuse.
  23. Contact between incompatible materials.
  24. Destructive testing.
  25. Misalignment.
  26. Excessive weathering.
  27. Unprotected storage.
  28. Improper shipping or handling.
  29. Theft.
  30. Vandalism.
- D. Refer to Section 01 74 13 for additional construction cleaning requirements.

END OF SECTION 01 31 13

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SECTION 01 31 19  
PROJECT MEETINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction Conference.
  - 2. Coordination Meetings.
  - 3. Progress Meetings.
- B. Construction schedules are specified in another Division-1 Section.

### 1.2 PRE-CONSTRUCTION CONFERENCE

- A. The General Contractor shall schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Architect and their consultants, the General Contractor, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative construction schedule.
  - 2. Critical Work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.
  - 7. Submittal of Shop Drawings, Product Data and Samples.
  - 8. Preparation of record documents.
  - 9. Use of the premises.
    - a. Owner's requirements.
  - 10. Office, Work and storage areas.
  - 11. Equipment deliveries and priorities.
  - 12. Safety procedures.
  - 13. First aid.
  - 14. Security.
  - 15. Housekeeping.
  - 16. Working hours.

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## 1.3 COORDINATION MEETINGS

- A. The General Contractor shall conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

## 1.4 PROGRESS MEETINGS

- A. The General Contractor shall conduct progress meetings at the Project site at regularly scheduled intervals. Notify the Owner and Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Architect, Contractor, subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
  - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind 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.
  - 2. Review the present and future needs of each entity present, including such items as:
    - a. Interface requirements.
    - b. Time.
    - c. Sequences.
    - d. Deliveries.
    - e. Off-site fabrication problems.
    - f. Access.
    - g. Site utilization.
    - h. Temporary facilities and services.
    - i. Hours of Work.
    - j. Hazards and risks.
    - k. Housekeeping.
    - l. Quality and Work standards.
    - m. Change Orders.
    - n. Documentation of information for payment requests.

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- D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
  - 1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 19

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SECTION 01 33 00  
SUBMITTALS

## PART 1 - GENERAL

### 1.1 SUBMITTAL PROCEDURES

- A. Submittals, including those specified herein to be submitted to the Architect, excluding those directed to a specific individual, shall be submitted directly to the Contractor for his review. Contractor will forward required submittals to the Architect for his review and approval.
1. **Contractors shall submit shop drawings in electronic format.** All electronic format drawing submittals shall be in Adobe Acrobat pdf format. All electronic format product data or other information shall be submitted in Adobe Acrobat pdf format. Coordinate with Architect prior to submitting.
- B. Contractors on this Project shall provide submittals in accordance with the requirements of this Section. Where a submittal is required by a Contractor but assistance from others, Contractors shall participate and cooperate to expedite each submittal.
- C. Where submission of samples, shop drawings, or other items are required from suppliers or subcontractors, it shall be the responsibility of the Contractor for whom the subcontractor is executing the Work to see that the submittal items required are complete and properly submitted, and corrected and resubmitted at the time and in the order required so as not to delay the progress of the Work. Submittals shall be made through the Contractor.
- D. The Contractor and PRIME CONTRACTOR shall check all shop drawings, samples, and other submittals and submit them to the Architect with a letter of transmittal giving his approval, comments, and suggestions. Each transmittal shall include the following information:
1. Date Submitted.
  2. Project title and number.
  3. Contractor's name and address.
  4. **Identification by Specification Section and quantity submitted for each submittal including name of subcontractors, manufacturer, or supplier.**
  5. Notification of deviations from the Contract Documents for each submittal.
  6. Contractor's written approval marked on each submittal. If contractor's submittals are not stamped and reviewed by the contractor prior to submitting for review, submittals will be sent back to the contractor.
  7. If there is more than one building in the project, shop drawings are to be submitted and packaged for each building and submitted in packages for each separate building. Shop drawings not submitted in this fashion may be rejected.
- E. The Contractor shall prepare, review, and stamp with his approval and submit, with reasonable promptness or within the specified time periods and in orderly sequence so as to cause no delay in the Work or in the Work of another contractor, submittals required by these Contract Documents or subsequently required by modifications.

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1. If the product is not as specified or approved by Addenda, it will be rejected by the Architect. Contractor shall not make submittals if the product manufacturer is not specified or listed in the Addenda. This will delay the submittal process and the contractor shall assume full responsibility for any delays caused by unapproved manufacturer submittals.
- F. The PRIME CONTRACTOR and Architect shall review and take action on submittals with reasonable promptness, so as to cause no delay in the progress. A reasonable period of time for review of and action taken on submittals shall be as specified herein, but in no case shall it be more than 14 calendar days from the time it is received by the Architect until the time the submittal is marked and forwarded or returned. Contractors shall allow sufficient mailing time for submittals.
- G. Identification of Submittals: Submittals, including re-submittals, shall be numbered with a Submittal Number. The Submittal Number shall consist of the applicable specification section number followed by a suffix number in consecutive order matching the numbers on the Submittal Log. The form of Submittals Numbers shall be as follows: ## ## ## - ### (example: 09 90 01-01).

## 1.2 REQUIRED SUBMITTALS

### A. Construction Schedules

1. A linear bar chart time control schedule shall be provided by each Contractor and compiled by the PRIME CONTRACTOR.
  - a. Each Contractor shall work overtime nights, and weekends, if necessary to maintain his portion of the schedule at no additional cost to the Owner.
  - b. Each Contractor is responsible to expedite approvals and deliveries of material so as not to delay job progress.
  - c. Each Contractor shall begin each phase of his work as quickly as physically possible, but not to impede or jeopardize the Work of other Contractors.
  - d. Each Contractor shall cooperate fully with the Contractor in the coordination of the Work with other Contractors and the convenience of the Owner as indicated in the Specifications.
  - e. Each Contractor shall participate in the updating of the schedule on a bi-weekly basis during the entire life of his contract.
    - (1) Contractor's schedule shall be updated bi-weekly and submitted to the Architect and other involved parties at least 2 days prior to the bi-weekly progress meeting.
  - f. The Project Construction Schedule will be updated reflecting Contractor's revised schedule and progress meeting results.

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## B. Schedule of Values

1. PRIME CONTRACTOR shall prepare and submit to the Architect a Schedule of Values for approval within 7 days after notice is given to proceed with Work. The Schedule of Values shall consist of a complete breakdown of the Contractor's contract sum showing the various items of the Work, divided so as to facilitate the approval of payments to the Contractor for Work completed. In addition to and conjunctive with the division of various items of work, the breakdown shall separate individual buildings within the Project, shall separate sitework from building(s) components and shall separate remodeling/renovation work from new construction work. The Schedule of Values shall be prepared on AIA Document G703, Continuation Sheet, showing the breakdown of items of Work and supported by such data to substantiate its correctness as the Architect may require.
2. Schedule of Values shall be coordinated with the Construction Schedules such that the percentages of Work completed closely relates to the values for the Work shown on the request for payments. At the beginning of the Project, each Contractor shall prepare a schedule of monthly progress payments showing the amount the Contractor may require for the Work proposed to be completed. The purpose of this schedule is to allow the Owner to determine what amounts of funds he will be required to have available each month during the progress of construction for progress payments.

## C. Project Use Site Plan

1. The PRIME CONTRACTOR, in cooperation with Contractors on this Project, shall prepare a proposed project use of the site plan.
2. Contractors shall confine operations at the site to areas within the areas indicated and as approved on the use of the site plan, and as permitted by law, ordinances, and permits. Site shall not be unreasonably encumbered with materials, products, or construction equipment.

## D. Shop Drawings and Product Data

1. Shop drawings are drawings, diagrams illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
  - a. Advertising brochures will not be accepted as shop drawings.
  - b. Erection and setting drawings as referred to in these Specifications will be considered as shop drawings and shall be submitted along with detailed shop drawings.
  - c. Where schedules are required to indicate locations, they shall be submitted as part of the shop drawing package for that item.
  - d. Shop drawings and schedules shall repeat the identification shown on the Contract Drawings.

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2. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.
  - a. Clearly mark each copy to identify pertinent materials.
  - b. Show dimensions and clearance required.
  - c. Show performance and characteristics and capacities.
  - d. Show wiring diagrams and controls.
  - e. Note variances from the Contract Documents including manufacturer's recommended changes to sequencing and to piping and control diagrams.
3. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, submittal name, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for Architect's "Action" marking. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through the Contractor will be returned "without action", which does not mean approval.
4. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
5. The Contractor shall make corrections required by the Architect and shall resubmit the required number of corrected copies of shop drawings until approved. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Architect on previous submissions.
6. The Architect will review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate review of an assembly in which the item functions.
7. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements or the Contracts documents unless the Contractor has informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the shop drawings.
8. Notations and remarks added to shop drawings by the Architect are to insure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost.
9. Should deviations, discrepancies, or conflicts between shop and contract drawings and Specifications be discovered, either prior to or after review, Contract Documents shall control and be followed.
10. The following number of shop drawings and product data submittals shall be made on this Project. Where an insufficient number of copies are submitted, no action will be taken until proper number of copies have been received. Additional copies beyond the number required will be discarded.

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## Schedule of Required Shop Drawings and Product Data

11. Architectural/Structural/Mechanical/Electrical/Civil
  - a. Upload to ftp site as instructed by the Architect.
12. Shop drawings will be marked as follows: Contractors shall take the following action for each respective marking:
  - a. "REVIEWED AND RELEASED" - Copies will be distributed as indicated under above schedule.
  - b. "REVIEWED AND RELEASED WITH CORRECTIONS" - Contractor may proceed with fabrication, taking into account the necessary corrections. Corrected shop drawings shall be resubmitted before fabrication of this Work is completed. Only shop drawings marked "REVIEWED AND RELEASED" by Architect will be permitted on the project site.
  - c. "REVISE AND RESUBMIT" - Contractor will be required to resubmit shop drawings in their entirety. No fabrication or installation shall be started until shop drawings so marked have been completely revised, resubmitted, and marked by Architect according to preceding Paragraphs 1. or 2.
13. Where re-submittal is required, submittal and distribution shall be as specified in subparagraph 11 above.
14. One set of shop drawings marked by Architect "REVIEWED AND RELEASED" be filed on the project site at all times. Shop drawing file may be electronic and accessible by the Architect and Owner on the on-site project computer. No installation of equipment, materials, or products is to be incorporated into the Project until shop drawings marked by Architect "REVIEWED AND RELEASED" have been received on the Project.

### E. Samples

1. The Contractor shall submit to the Architect triplicate (3) samples to illustrate materials or workmanship, colors, and textures, and establish standards by which the Work will be judged. A complete list of required samples will be submitted to the Contractor for use as a check list.
2. By approving and submitting samples, the Contractor thereby represents that he has determined and verified materials, catalog numbers, and similar data, and that he has checked and coordinated each sample with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
3. The Contractor shall resubmit the required number of correct or new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted samples to revisions other than the changes requested by the Architect on previous submissions.
4. The Architect will review samples but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's approval of a separate item shall not indicate approval of an assembly in which the item functions.

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5. The Architect's action shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of the deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the samples.
6. Unless otherwise specified, samples shall be in triplicate and of adequate size to show function, equality, type, color, range, finish, and texture of material. When requested, full technical information and certified test data shall be supplied.
  - a. Each sample shall be labeled, bearing material name and quality, the Contractor's name, date, project name, and other pertinent data.
  - b. Transportation charges to and from the Architect's office must be prepaid on samples forwarded. Approved samples shall be retained by the Architect until the Work for which they were submitted has been accepted.
7. Materials shall not be ordered until approval is received. Materials shall be furnished, equal in every respect to approved samples. Where color or shade cannot be guaranteed, the maximum deviation shall be indicated by the manufacturer. Work shall be in accordance with the approved samples.

## F. Operation and Maintenance Data

1. Typed or printed instruction covering the operation and maintenance of each item of equipment furnished, shall be prepared and placed in a notebook by the Contractor and submitted to the Architect for review and transmittal to the Owner. The instructions, as applicable, shall include the following:
  - a. Any schematic piping and wiring diagrams;
  - b. Any valve charts and schedules;
  - c. Any lubrication charts and schedules;
  - d. Guides for troubleshooting;
  - e. Pertinent diagrams of equipment with main parts identification;
  - f. Manufacturer's data on all equipment;
  - g. Operating and maintenance instructions for all equipment;
  - h. Manufacturer's parts list; and,
  - i. Any testing procedures for operating tests.
  - (1) Three (3) copies of the above instruction books shall be furnished prior to Final Payment. The books shall describe the information to be covered clearly and in detail and shall be in form and content satisfactory to the Owner.

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2. The Contractor shall instruct the Owner's operating personnel in the proper use, care and emergency repair of all equipment installed by it before Final Payment. The Contractor shall call particular attention to any safety measures that should be followed. The instruction shall be adequate to train the Owner's operating personnel in the proper use, care and emergency repair of such equipment.
- G. The work shall be furnished and installed in accordance with the Drawings, Specifications and as additionally required by the manufacturer's instructions, and where a conflict occurs between the Drawings or Specifications and the manufacturer's instructions, the contractor shall request clarification from the Architect prior to commencing the work and shall follow the interpretations given by the Architect.

## 1.3 MATERIAL SAFETY DATA SHEETS

- A. In compliance with the OSHA Hazard Communication Standard (1910.1200, 08-24-1987) contractors are required to have on the site, MSDS (Material Safety Data Sheets) for ALL products classified as hazardous that their firm has knowledge that they will be furnishing, using, or storing on the jobsite during the duration of this Project. MSDS sheets are not part of the shop drawing review process.
  1. The Contractor at completion of the Work shall provide the Owner with the MSDS sheets for the hazardous products used on the Project site during construction.

PART 2 - PRODUCTS (NOT USED).

PART 3 - EXECUTION (NOT USED).

END OF SECTION 01 33 00

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SECTION 01 35 00

## PRECEDENCE AND CONFLICT PROCEDURES AND INTENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies special precedence and conflict procedures and intent.

#### 1.3 PRECEDENCE AND CONFLICT PROCEDURES

- A. If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply:

1. The terms and conditions as set forth in the Bidding Requirements, including legal advertisement thereof, shall have full force and effect until such time as the Standard Form of Agreement between Owner and Contractor is executed between the Owner and the Awardee.
2. Where there is a conflict between the Bidding Requirements and the Contract Documents, the Contract Documents shall govern.
3. Where requirements specifically set forth in the Standard Form of Agreement Between Owner and Contractor and the Supplementary Conditions and other specifications requirements are in conflict, the Standard Form of Agreement Between Owner and Contractor shall govern.
- 4.. Where there is conflict between the Drawings and Specifications and conflict within the Drawings or within the Specifications, the conflict, where applicable, shall be resolved by providing better quality or greater quantity as further provided herein.

- B. Where there is a conflict in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the more expensive way of doing the Work and the larger quantity required. Only changes or interpretations covered by Addenda or written from the Architect will be permitted during construction of the Work. The Contractor shall perform no portion of the Work at any time without Contract Documents or where required, received Shop Drawings, Product Data, or Samples for such portion of the Work.

#### 1.4 INTENT

- A. It is the intent of the Contract Documents to accomplish a complete and first-grade installation in which there shall be installed new products of the latest and best design and manufacturer, and workmanship shall be thoroughly first class, executed by competent and experienced workmen.

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1. Details of preparation, construction, installation, and finishing encompassed by the Contract Documents shall conform to the best practices of the respective trades, and that workmanship, construction methods, shall be of first class quality so as to accomplish a neat and first class finished job.
2. Where specific recognized standards are mentioned in the Specifications, it shall be interpreted that such requirements shall be complied with.
3. The intent of the Contract Documents is to include all labor, equipment, and materials necessary for the proper and timely execution and completion of the Work, even though such labor, equipment, materials are not expressly included in the Contract Documents.
4. The Contract Documents are complimentary, and what is required by one will be as binding as if required by all.
5. The Contractor will be required to perform all parts of the Work, regardless of whether the parts of the Work are described in Sections of the Contract Documents applicable to other trades.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 35 00

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## SECTION 01 42 19 REFERENCE STANDARDS AND DEFINITIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Contractual 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. "Reviewed": The term "reviewed," when used in conjunction with the Architect's/Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Architect's/Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Contractor": The term "contractor," "Contractor," "construction manager," or "Construction Manager " describes to entity who has a signed agreement with the Owner as the primary entity contracted to perform the Work. The terms are used interchangeably within this document.
- D. "Directed": Terms such as "directed," "requested," "authorized," "selected," "reviewed," "required," and "permitted" mean directed by the Architect/Engineer, requested by the Architect/Engineer, and similar phrases.
- E. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- F. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted", "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, who performs a particular activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
- I. "Project site" is the space available to the Contractor for performing installation activities, either exclusively or in conjunction with others performing work as part of the Project.
- J. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

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- K. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the industry that control performance of the Work.
1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
  2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- L. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- M. "Owner or Owner's Representative": The term Owner or Owner's Representative shall mean St. Johns County School District designated Project Manager.

## 1.3 WASTE MANAGEMENT DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitability, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.

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- J. Reuse: To reuse a construction waste material in some manner on the Project site.
- K. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products over time through outgassing: solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywoods; and foam insulation. When released, VOCs can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- Q. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- R. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately reduce the amount of material being landfilled.

## 1.4 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's "MasterFormat" system.
- B. Specification Content: These 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

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- a. 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.

## 1.5 INDUSTRY STANDARDS

- A. **Applicability of Standards:** Unless the Contract Documents include more stringent requirements, applicable 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 the standards in effect as of the date of the Contract Documents, unless otherwise indicated.
- C. **Conflicting Requirements:** Where compliance with 2 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 uncertainties and requirements that are different but apparently equal to the Architect/Engineer for a decision before proceeding.
  1. **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 the requirements. Refer uncertainties to the Architect/Engineer for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in installation on the Project must be familiar with industry standards applicable to its installation activity. Copies of applicable standards are not bound with the Contract Documents.
  1. Where copies of standards are needed to perform a required installation activity, obtain copies directly from the publication source and make them available on request.
- E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Inc.'s "Encyclopedia of Associations," which is available in most libraries.

## 1.6 SUBMITTALS

- A. **Permits, Licenses, and Certificates:** For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 19

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## SECTION 01 45 00 QUALITY CONTROL AND TESTING LABORATORY SERVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to the Work of this Section.

#### 1.2 SUMMARY

- A. Definitions: Quality control services include inspections and tests, and sections related thereto including reports, but do not include contract enforcement activities performed directly by Architect. Quality control services include those inspections and tests and related actions performed by independent agencies and governing actions performed by independent agencies and governing authorities, as well as directly by Contractor.
- B. Inspections, tests, and related actions specified in this Section and elsewhere in Contract Documents are not intended to limit contractors quality control procedures which facilitate compliance with requirements of Contract Documents.
- C. Requirements for quality control services by Contractor, as requested or to be requested by Architect, Owner, governing authorities, or other authorized entities are not limited by provisions of this Section.
- D. Contractors shall review and become familiar with the requirements of the General Conditions covering the provisions for testing of the Work.
- E. The General Contractor shall employ and pay for services of an independent testing laboratory to perform specified inspection, sampling, and testing services. The Prime Contractor will be required to coordinate all testing requirements with the testing laboratory service.
- F. Inspections and testing required by laws, ordinances, rules, regulations, or orders of public authorities and General Conditions.
- G. Certification of products and mill test reports: Respective Specification Sections.
- H. Test, adjust, and balance of equipment.
- I. Inspection, sampling, and testing: Soils, asphalt, and concrete.
- J. Mock-up requirements as specified herein. Refer to the individual specification sections for detail mockup requirements. General mockup requirements are specified herein.

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## 1.3 CONTRACTOR RESPONSIBILITIES

- A. Inspections, tests, and similar quality control services including those specified to be performed by independent agency are the Owner's responsibility, and costs thereof are not to be included in the Contract Sum.
- B. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are the responsibility of the Contractor; except, first retest is responsible party if retest results are satisfactory. Retesting of work revised or replaced by Contractor is Contractor's responsibility, where required tests were performed on original work.
- C. Responsibility for Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.
- D. Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests, taking of samples, and similar activities is Contractor's responsibility.
- E. Sampling and testing is required, but not limited to, the following Sections of Work:
  - 1. 03 20 00 Concrete Reinforcement
  - 2. 03 30 00 Cast-In-Place Concrete
  - 3. 04 05 13 Mortar
  - 4. 04 05 16 Masonry Grout
  - 5. 04 20 00 Unit Masonry
  - 6. 05 12 00 Structural Steel
  - 7. All other Sections and requirements as may be specified in the Project Manual. Contractor is responsible to review all specification sections and comply with all quality control and testing procedures as specified in each section.
- F. Test procedures to be used shall be submitted for approval of the Architect where other than those specified are recommended by the testing agency.
- G. Cooperate with laboratory personnel to provide access to Work and to manufacturer's operations.
- H. Assist laboratory personnel in obtaining samples at the site.
- I. Notify laboratory sufficiently in advance of operations to allow for his assignment of personnel and scheduling of tests.

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- J. Should the contractor fail to schedule laboratory services or fail to cancel laboratory services, if the need arises, all additional cost shall be borne by the Contractor.
- K. Employ, and pay for, services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.
  - 1. Separate laboratory shall be approved by the Owner and the Architect.

## 1.4 QUALIFICATION OF LABORATORY

- A. The testing laboratory shall meet "Recommended Requirements of Independent Laboratory Qualifications," published by American Council of Independent Laboratories. For concrete and steel the laboratory shall comply with the basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."
- B. Submit a copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of deficiencies reported by inspection.
- C. Testing equipment shall be calibrated at maximum 12 month intervals by devices of accuracy traceable to either:
  - 1. National Bureau of Standards.
  - 2. Accepted values of natural physical constants.
  - 3. Submit copy of certificate of calibration, made by accredited calibration agency.
- D. Submit documentation of specified requirements. Submit 2 copies to the Architect.

## 1.5 SUBMITTALS

- A. Submit 3 copies of test reports directly to the Superintendent, from the approved testing service, with one copy to the Prime Contractor and one copy to the Architect.
- B. Submit copies of the daily logs to the Superintendent.
- C. Daily logs and test reports shall be submitted in electronic format in lieu of hard copies. Electronic format shall be Adobe Acrobat 5.0 or higher, in PDF format. Electronic submittals shall be emailed directly to the General Contractor and the Architect.

## 1.6 LABORATORY DUTIES, LIMITATIONS OF AUTHORITY

- A. Provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling, and testing of materials and methods of construction.

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1. Comply with specified standards; ASTM, other recognized authorities and as specified.
  2. Ascertain compliance with requirements of Contract Documents.
- C. Promptly notify the Architect and the General Prime Contractor of irregularities or deficiencies of Work which are observed during performance of services.
- D. Promptly submit electronic copy of reports of inspections and tests to the Architect, and submit one (1) copy direct to the General Prime Contractor, including the following information, as applicable:
1. Date issued.
  2. Project title and number.
  3. Testing laboratory name and address.
  4. Name and signature of inspector.
  5. Date of inspection or sampling.
  6. Record of temperature and weather.
  7. Date of test.
  8. Identification of product and specification.
  9. Location in project.
  10. Type of inspection or test.
  11. Observations regarding compliance with Contract Documents.
- E. Perform additional services as required by Owner on a unit cost, as submitted.
- F. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Approve or accept portion of Work.
  3. Perform duties of the Contractor.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 REPAIR AND PROTECTION

- A. Upon completion of inspection, testing, sample-taking, and similar services performed on Work, protect work, repair damaged Work and restore substrates and finishes to eliminate deficiencies, including defects in visual qualities of exposed finishes. Protect Work exposed by or for service activities and protect repaired Work. Repair and protection is Contractor's responsibility, regardless of assignment or responsibility for inspection, testing, or similar service. Work disturbed or altered after completion of testing, sample taking and similar service shall be re-inspected or retested by the same testing agency with the cost borne by the Contractor.

END OF SECTION 01 45 00

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SECTION 01 50 00  
TEMPORARY FACILITIES

## PART 1 - GENERAL

### 1.1 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the Work of this Section.

### 1.2 GENERAL

- A. Furnish labor, materials, tools, equipment, and services for temporary facilities, including maintenance and their subsequent removal, in accordance with provisions of the contract Documents and as required for the progress and completion of the Project.
- B. Pay applicable costs unless specifically stated otherwise.
- C. Coordinate temporary facilities work with other trades and the Owner. Rerouting or relocation expenses shall be paid by the responsible Contractor doing the Work if the temporary work has not been coordinated with other trades and the Owner. Routing or relocations of temporary facilities shall also be reviewed by the Architect and Owner before installation.
- D. Provide, maintain, and remove supplementary or miscellaneous item, appurtenances, and devices incidental to, or necessary for, a sound, secure, and complete installation.
- E. Contractors shall provide and maintain temporary facilities as required for the progress and completion of his contract except as otherwise noted.
- F. Repair, as required, work that has been interfered with or damaged as a result of temporary facilities work.
- G. The cost for repair of temporary facilities due to abuse or misuse of said facilities by other Contractors will be the financial responsibility of the responsible Contractor that abused or misused that temporary facility.
- H. Provide every protection to temporary facilities as required.

NOTE: Temporary services will not commence until that Contractor responsible for such temporary services start their field work and place the temporary services into operation.

- I. Temporary facilities are to be maintained and kept in good operating condition. Maintenance personnel necessary to perform this Work shall be provided. Maintenance work and repair shall be done in a timely manner causing minimal interference to other trades.
- J. Temporary services shall be placed into operations by Contractor in an expedient manner as required by job conditions.
- K. Additional costs for providing temporary services beyond the time period provided, shall be at the expense of that contractor requiring that extended service time period.

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- L. Provide and maintain temporary facilities in compliance with governing rules, regulations, codes, ordinances, and laws of agencies and utility companies having jurisdiction over work involved in project.
- M. Each Contractor is responsible for temporary work provided, and shall obtain necessary permits and inspections for such work.
- N. Do not interfere with normal use of roads in vicinity of project site except as authorized by the City of Orlando, Florida, Traffic Division and all other authorities having jurisdiction.
  - 1. Permits that need to be obtained for streets that need to be partially closed or closed due to demolition operations shall be paid for and obtained by the General Contractor.
- O. Each Contractor shall provide at his own expense, normal weather protection as required to carry on his work expeditiously during inclement weather and to protect his work and materials from damage by the weather unless stated otherwise herein.

## 1.3 TEMPORARY FIELD OFFICE

- A. The General Contractor shall provide his own field office for his staff and for the Architect, for their use on the project site.
- B. General Contractor's and Owner's Representative's Field Office
  - 1. The General Contractor shall provide a secure office approximately 12' w x 40' long (minimum) and facilities to accommodate field personnel, storage of field documents, layout space for Drawings and computer for production of as-built drawings for both the General Contractor and the Architect.
  - 2. Costs associated with General Contractor's and Architect's field office are the responsibility of the General Contractor.
  - 3. Field office shall be heated and air-conditioned with lockable doors, operable windows and serviceable finishes.
  - 4. Provide the Owner's Representative a partitioned office area, minimum 12' x 10' furnished with the following items:
    - a. Desk, chair, filing cabinet and telephone and telephone line. (Telephone service shall be provided.)
    - b. Lighting.
    - c. Layout table. (36" x 48" minimum.)
    - d. Tackboard.
    - e. Copier.
    - f. Fax machine.
    - g. Laptop computer. Minimum 1 GHz, 15" display, 100 GB hard drive, 56K V.90 modem and dedicated phone line for the computer modem, disk drive and Windows XP.
    - h. Provide internet connections and email addresses for the job site trailer for electronic document format transactions and uses.

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5. Provide a large general meeting room for the Progress Meetings and other meetings as specified and as may be required. Meeting room shall be provided with tables and chairs to accommodate up to 20 people maximum.
  6. Field office shall be kept clean and orderly at all times.
- C. Sheds
1. Each subcontractor shall provide watertight trailers as required for his work for storage of materials subject to weather damage, vandalism, or theft, including lockable doors and floors above the ground.
- D. Each subcontractor shall provide his own office trailer for his own needs and on-site personnel, coordination and supervision. Each subcontractor shall have an on-site computer and email addresses for electronic communications.

## 1.4 CONSTRUCTION PLANT

- A. The General Contractor and each subcontractor is to provide all items such as cranes, hoists, and other lifting devices; scaffolding, staging, platforms, runways, and ladders; temporary flooring as required for the proper execution of his Work.
1. Scaffolding and ladders must meet OSHA requirements.
  2. No aluminum ladders are permitted.
- B. Provide such equipment with proper guys, bracing, guards, railing, and other safety devices as required by governing authority and safety standards.
- C. The General Contractor shall provide, maintain and remove suitable means of travel between floor levels of building, including exterior grade levels and to all roof levels for his use until permanent stair systems are installed.

## 1.5 SIGNS

- A. The General Contractor shall provide two (2) 8 foot by 8 foot painted wood signs conforming to future Drawing provided by the Architect.
1. Obtain and pay for sign permit.
  2. Erect sign prior to starting construction work.
  3. Use 1/2 inch exterior grade plywood with 2 by 4 inch framing.
    - a. Paint face of sign white.
    - b. Paint edges and back of sign red.
    - c. Text to be determined.
- B. No other signs will be permitted.
- C. Locate and erect sign where directed by the Architect or Owner's Representative.

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- D. Signage may be printed on Tyvek and wrapped around plywood.

## 1.6 TEMPORARY UTILITIES

### A. General

#### 1. Codes and Standards

- a. National Electric Code (ANSI C1).
- b. National Electric Safety Code.
- c. National Fire Protection Association Pamphlet.
- d. Federal and State Requirements.
- e. Utility Company Regulations.
- f. OSHA

#### 2. Permanently Enclosed and Partially Enclosed

- a. "Permanently Enclosed" shall mean that permanent exterior walls and roofs are in place and weathertight, windows are in place and glazed, and all entrance enclosures are either permanently in place or are provided with suitable temporary enclosures. The Architect shall determine when the building is permanently enclosed.
- b. "Partially Enclosed" shall mean that permanent exterior walls (excluding caulking) and concrete floor(s) or roof is in place; windows are temporarily sealed; and entrances are temporarily sealed off. The Architect shall determine when the building or partial building is partially enclosed.

- B. The General Contractor and subcontractors shall provide at his own expense, weather protection as required to carry on his work expeditiously during inclement weather and to protect his work and materials from damage by the weather unless stated otherwise herein.

### C. Description of Temporary Systems

#### 1. Temporary Electricity – Electrical Subcontractor or General Contractor

- a. The Electrical Subcontractor shall to provide temporary electric service as detailed below.
- b. The Electrical Subcontractor shall comply with NEC and OSHA.
- c. Each subcontractor shall provide their own grounded, UL listed extension cords and other accessories to point of operation.
- d. The General Contractor and subcontractors who require primary power, secondary power centers, or service connections in excess of the specified minimum shall make arrangements with the Electrical Subcontractor\ and pay costs thereof.
- e. Refer to additional requirements specified in this Section.

#### 2. Temporary Lighting – Electrical Subcontractor or General Contractor

- a. Safety Lighting: Provide safety lighting in all construction areas and temporary walkways at all times.

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- b. Lamps shall be covered with safety guard or deeply recessed in reflector. Do not suspend by their electrical cords unless cord and fixture are designed for that purpose.
    - c. Circuits for power are to be separate from circuits used for lighting.
    - d. Refer to additional requirements specified in this Section.
  3. Temporary Water – General Contractor
    - a. For construction purposes:
      - General Contractor shall supply adequate water hoses from hose bibbs to point of his operations.
      - Provide protection against freezing of the temporary water system.
      - The temporary water service shall be removed when directed by the Architect.
    - b. Maintain adequate volume of water for required purposes.
    - c. The General Contractor and subcontractors are to provide drinking water and ice for his own forces.
    - d. The Plumbing Subcontractor or General Contractor shall provide the temporary water line from the meter to the building work areas.
  4. Temporary Toilets – General Contractor
    - a. The General Contractor shall provide and maintain temporary toilet facilities, including toilet paper for the use of all workmen and authorized parties throughout construction period.
    - b. Provide the following minimum number of approved enclosed combination toilet and urinal units for construction personnel:
      - For less than 20 employees: 1
      - For 20 or more employees: 2 per 40 workers.
      - Computation of men and women present included men and women of all contractors.
    - c. Location
      - Within the project site where directed by the Architect and General Contractor.
      - Secluded from public observation.
    - d. Moving of portable chemical toilets for installation, cleaning, and removal shall be done during normal working hours.
  5. Temporary Fire Protection – The General Contractor and each subcontractor.
    - a. Each contractor shall provide, maintain, and perform protection and prevention of fire or fire hazards during the construction period for the protection of construction materials and personnel in accordance with Owner's Underwriter's recommendation, laws, and regulations. This includes but is not limited to, fire extinguishers, special signs, and removal of combustible materials.

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- D. Cost of Installation, Operation and Maintenance
  - 1. The General Contractor and the appropriate subcontractor shall provide and maintain specified temporary utilities until date of Substantial Completion unless otherwise indicated. Pay costs of installation, operation and maintenance of temporary utilities until Date of Substantial Completion.
    - a. Temporary Lighting: Electrical Subcontractor or General Contractor.
    - b. Temporary Toilets: General Contractor.
    - c. Temporary Fire Protection: All contractors.
- E. Cost of Utility Consumption
  - 1. Designated Contractor responsible for costs of consumables for temporary utilities unless otherwise indicated:
    - a. Temporary Electricity - Electrical Energy during construction: By General Contractor or electrical subcontractor.
    - b. Temporary Water - Water: By General Contractor or plumbing subcontractor.
    - c. Temporary Telephone: Telephone (by each contractor).
- F. Monitor Temporary Utilities
  - 1. Parties designated to provide a temporary utility shall be responsible for damage to his Work or to that of other contractors caused by a defect in such utility.
    - a. Enforce compliance with applicable codes and standards.
    - b. Enforce safe practices.
    - c. Prevent abuse of services and utilities.
    - d. Prevent damage to finishes.
  - 2. Do not allow wasteful use of consumables.
- G. Use of Permanent Systems for Construction Purposes
  - 1. Obtain prior written authorization for use of systems from the Architect. Indicate the following:
    - a. Conditions and reasons for use.
    - b. Provisions relating to equipment warranties.
  - 2. Modify and extend system as necessary to meet temporary utility requirements.
  - 3. Upon completion of Work, or when required by the Architect, restore permanent system to specified condition prior to Substantial Completion.
    - a. Replace burned out or defective lamps (General Contractor or electrical subcontractor).
    - b. Repair or restore damaged parts or components.
  - 4. Refer to additional requirements specified in this Section.

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## H. Materials

### 1. General

- a. May be new or used, but must be adequate for purpose intended. Must not create unsafe or unsanitary conditions, nor violate requirements of applicable codes. Comply with applicable Federal and State regulations.
- b. Must be removed when Project is completed.

### 2. Temporary Lighting (General Contractor or electrical subcontractor)

- a. Comply with Division 16 and as specified above.
- b. Receptacles, fixtures:
  - Standard products, meeting UL requirements.
  - Provide heavy duty guards on fixtures.
  - Provide appropriate types of fixtures and receptacles for environment in which used, in accordance with NNEC, NEMA, and OSHA standards.
- c. Refer to additional requirements specified in this Section.

### 3. Temporary Toilets (by General Contractor)

- a. Comply with Division 15.
- b. Equipment: Standard products, meeting code requirements. Toilet Facilities: Self ventilated portable chemical toilets.
- c. Toilet Tissue: Provide at each toilet, on suitable dispenser, with adequate reserve supply. Monitor daily.

## I. Installation

### 1. General

- a. Comply with applicable section of Divisions 15 and 16 and Federal and State regulations.
- b. Install work in neat and orderly manner.
- c. Make structurally, mechanically, and electrically sound throughout.
- d. Maintain to give safe, continuous service, and to provide safe working conditions.
- e. Modify and extend systems as work progress requires.

### 2. Temporary Lighting

- a. Control lighting at secondary power centers unless otherwise specified.
- b. Install exterior security lighting.
  - Illuminate project site as specified.
- c. Refer to additional requirements specified in this Section.

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3. Temporary Telephone
  - a. Service and distribution wiring may be overhead or under ground.
4. Temporary Toilets
  - a. Erect securely
  - b. Service as often as necessary to prevent accumulation of wastes and creation of unsanitary conditions.

## 1.7 SPECIAL PRECAUTIONS AND REQUIREMENTS

- A. Do not block required exits.
- B. Conform to all Owner's and Architect's rules and regulations.
- C. Do not interfere with normal use of existing active utility services, except as absolutely necessary to execute required work involving such services, and then only after proper arrangements have been made through the proper authority.
- D. Each contractor is responsible in the performance of his work for protection of existing active utility services.
  1. Notification of proposed interruption of service must be made 2 days in advance with the Owner.

## 1.8 SAFETY AND PROTECTION

- A. General
  1. The General Contractor and each subcontractor must erect and maintain, as required by existing conditions and progress of the Work, every reasonable safeguard for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities.
  2. The General Contractor and each subcontractor must provide protection at all times against damage with vandalism, theft, weather, and other causes to completed Work, materials, and apparatus.
  3. The General Contractor and each subcontractor shall take every appropriate precaution to prevent damage to his work and workers of other contractors. Damage which is caused to another contractor's Work will be repaired or replaced at the damaging contractor's expense.
  4. The General Contractor and each subcontractor shall protect existing trees, planting, structures, road, and walks during progress to the Work.
  5. The General Contractor and each subcontractor shall submit 3 copies of Contractor(s)' Safety Program and designate a responsible employee at the site whose duty shall be the prevention of accidents. The person shall be the Contractor's Superintendent unless otherwise designated by the contractor in writing to the Architect.

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6. No contractor shall load or permit any part of the Work to be loaded so as to endanger its safety.
  7. The General Contractor shall have a full-time, dedicated and qualified Safety Person for the Project to inspect job for safety hazards of all trades. This person will hold and record safety meetings once a week at the Superintendent Meeting. The Safety Person shall point out immediately to each Contractor each safety hazard he finds. Each Contractor shall correct the safety problem immediately.
    - a. If safety problems are not corrected by appropriate trade, then the Safety Person shall take corrective action and charge the appropriate parties.
    - b. This Safety Person shall record all accidents for the Project.
  8. The General Contractor and each subcontractor shall provide safety protection at each area which, because of his operation, creates a safety hazard.
  9. The General Contractor shall take every appropriate safety precaution to prevent damage to the work or injury to the workers of other contractors. This includes, but not limited to, overhead protection.
  10. In an emergency affecting the safety of life, the work or adjoining property, the contractor, without special instruction or authorization from the Architect, or Owner, shall take the action necessary to prevent such threatened loss of injury.
  11. The General Contractor and each subcontractor shall provide at the site first aid supplies for minor injuries. All injuries must be reported immediately to the job office, and the Superintendent of the General Contractor shall make a written report thereof. A copy of same shall be sent to the Architect.
  12. Owner reserves the right to personally inspect and or employ a third party inspector to make periodic inspection of the site to determine extent of compliance to safety conditions. Any observed safety conditions would be forwarded immediately in written format to the Safety Representative of the General Contractor for corrective action.
- B. Water Control
1. The General Contractor shall be responsible for erosion control, dewatering, pumping, and removal of all water until mass excavation has been completed unless otherwise noted.
- C. Safety Devices
1. The General Contractor shall provide fences, barricades, bridges, railings, and guards for protection of construction personnel and the public, and to provide protection of his Work installed.
  2. The General Contractor shall provide additional protection as may be required if additional protection is needed at a different time.
- D. Streets and Sidewalks
1. The General Contractor shall be responsible to keep public streets adjacent to project site free of mud, debris, and other foreign materials resulting from all project construction and vehicular traffic leaving site, to the satisfaction of governing public authorities regulating such conditions and Architect.

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2. Do not interfere with normal use of streets in vicinity of project site except as indicated or as absolutely necessary to execute required work, and then only after proper arrangements have been made with authorities having jurisdiction including traffic control as applicable.
- E. Hazardous Materials
1. When the use of storage of hazardous materials or equipment is necessary for the execution of the Work, the contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel. Such use and storage shall also be in accordance with governing authority. The use of explosives shall not be permitted.
- F. Protect existing property from damage during the work required by these Contract Documents. Any damage done to existing property shall be repaired satisfactorily to the approval of the Superintendent and/or Owner.
- G. Existing property includes, but shall not be limited to, buildings, sidewalks, curbs, lawns, grass, trees and shrubs.
- H. In the event of temporary suspension of work for inclement weather or for any other reasons, the Contractor shall protect all work and materials against damage or injury. If damage or injury results from failure to protect, such work and materials shall be removed and replaced at no additional cost to the Owner.
- I. All existing water and gas pipe, sewers, drains, electrical ducts, telecom duct, and other duly authorized structures shall be properly supported and protected by and at the expense of the Contractor during the construction of work under or near them and so as not to interfere with their use. They shall be left in as good condition on completion of the work as when found by the Contractor.

## 1.9 TEMPORARY FIRST AID FACILITIES

- A. The General Contractor and all subcontractors shall provide first aid facilities as required by Federal, State, or Local Safety Regulations.

## 1.10 TEMPORARY STORAGE

- A. The General Contractor and each subcontractor shall provide suitable storage facilities for materials delivered to site and protect materials from weather and damage.
1. Temporary storage of materials at site shall not interfere with the Work of other contractors or the Work and property of the Owner. If necessary or as directed by the Architect, stored materials shall be relocated or removed.
  2. Location on site for storage facilities shall be in designated areas as approved by the Architect and Owner.

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## 1.11 TEMPORARY ROADS, ACCESS, AND DELIVERY

- A. The General Contractor shall provide and maintain a temporary access on site as necessary for vehicles and equipment of all contractors requiring access. Remove temporary roads as directed by Owner or Architect.
- B. Each contractor shall repair damage to existing pavement or other construction and landscaping when damage results from operations under his Contract.
- C. The General Contractor shall provide and maintain a secure and smooth area around the building perimeter to allow all trades to work efficiently. Graveled areas for "lay-down" and staging shall be provided and maintained by the General Contractor.

## 1.12 OPENINGS FOR ELECTRICAL, MECHANICAL, AND OTHER TRADES

- A. Temporary openings not called for on the Drawings, which may be required for the purpose of bringing equipment into the buildings or for placing same, shall be performed as approved by the Architect. The contractor shall perform the Work of providing and maintaining such openings and of restoring the structure.
- B. The contractor whose equipment or work requires temporary openings is to bear the cost involved in providing such openings and restoring the structure. Ample notice shall be given of size and location of such openings by the contractor requiring same.
- C. Holes provided in general construction work to permit installation of lines for temporary mechanical and electrical services shall be restored by the contractor doing the affected construction work, after removal of such lines, at no extra cost.

## 1.13 SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

- A. These Construction Documents and the construction hereby contemplated shall be governed by applicable provisions of Federal, State, and local regulations for construction safety in the State in which the project is located.
  - 1. The General Contractor and each subcontractor shall be responsible for the safety and health of persons and property affected by the contractor's performance of the Work including work performed by subcontractors. This requirement shall apply continuously during the entire contract period and shall not be limited to normal working hours.
  - 2. The General Contractor and each subcontractor shall designate a qualified safety and health representative to be responsible for the administration of the Contractor's Safety and Health program.
- B. Each contractor shall be responsible for compliance with the above aforesaid safety and health regulations for construction as applicable to the Contractor's Contract and the Contractor's construction means and methods. The General Contractor shall be liable for violations as may be cited or charged against the subcontractor by authorities governing the safety and health regulations for construction.
  - 1. Each subcontractor shall comply with the General Contractor's Safety Program.

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## 1.14 UTILITY PROTECTION

- A. Existing utility lines and structures indicated or known, and utility lines constructed for this Project shall be protected from damage during demolition and construction operations.
- B. Locate and flag lines and structures before beginning demolition and other related operations.
- C. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the Architect and affected utility in ample time for the necessary measures to be taken to prevent interruption of the services.
- D. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Superintendent and the affected utility.

## 1.15 ENVIRONMENTAL PROTECTION

- A. In order to prevent and to provide for abatement and control of environmental pollution arising from the demolition activities of the contractor and his subcontractors in the performance of this Contract, they shall comply with applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement as well as the specific requirements stated elsewhere in the Contract Documents.
- B. Items having apparent historical or archaeological interest which are discovered in the course of demolition activities shall be carefully preserved. The contractor shall leave the archaeological find undisturbed and shall immediately report the find to the Architect so that the proper authorities may be notified.
- C. No Contractor shall pollute water resources with fuels, oils, bitumens, calcium chloride, acids or harmful materials. It is the responsibility of each contractor to investigate and comply with applicable federal, state, county, and municipal laws concerning pollution of rivers and streams. Work under this Contract shall be performed in such a manner that objectionable conditions will not be created in water resources through or adjacent to the project areas.
  - 1. Spillages: Throughout the year, special measures shall be taken to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides and insecticides, and cement from entering water resources.
  - 2. Disposal: If waste material is dumped in unauthorized areas, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as directed by the Architect, and replaced with suitable fill material, compacted and finished with topsoil, at the expense of the Contractor.

## 1.16 TEMPORARY ELECTRICAL POWER AND LIGHT

- A. The General Contractor shall pay for the cost of electrical energy used on this Project.

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- B. The General Contractor or electrical subcontractor shall make arrangements for and pay for installation of temporary metered service including one time utility company "up/down" charges. Charges for connections to mains, extensions, furnishing of meters or equipment and accessories shall be included in the General Contractor's or electrical subcontractors bid. Regardless of whether the Owner may have to sign with the utility company for these services, the electrical contractor shall include in his proposal fees, inspection charges, permit charges, work charges, and other charges and shall be ready to deposit with the utility company said fees when required at time of Owner's signing for utility service.
- C. The General Contractor or electrical subcontractor, shall provide, maintain, and connect the temporary electric service for the project offices, temporary lighting and power tool usage during the construction and shall include service poles, main disconnect means, wiring, and distribution equipment.
- D. The General Contractor or electrical subcontractor shall provide the following temporary lighting and power distribution system for this Project.
  - 1. Provide ninety circuit center panel with 408 amp main disconnect and with a minimum of ninety 20 ampere receptacles (one per circuit) at the point of service.
  - 2. Provide 60 ampere, three wire plus ground circuit with appropriate outlets at the point of service for miscellaneous power taps.
  - 3. Provide 60 ampere, three wire plus ground circuit from the point of service to each corridor with load center panels and a sufficient quantity of 20 ampere receptacles and 60 ampere, three wire plus ground receptacles along each corridor as directed by Architect. It is intended that power distribution points are located so that extension cords will not have to be over 100 feet long.
    - a. Provide over-current protective device at point of service.
  - 4. Provide lighting outlets, protected by 20 ampere circuits, 30 foot candles for each corridor. Outlets shall be lamped with not less than 200 watt fluorescent lamps.
  - 5. Extend temporary lighting into all rooms for lighting of work spaces.
  - 6. Circuits and feeders shall be protected by appropriately rated ground fault detection and interruption devices.
  - 7. In addition to the preceding temporary power and lighting, provide and subsequently remove for:
    - a. Temporary safety lighting and security lighting. Security light to work at hours of darkness and include exterior floodlights; safety lighting shall be continuous during working hours.
    - b. Project office: Reconnect existing Contractor's trailers and offices into new temporary power.
- E. Lamps for temporary lighting shall be provided and maintained by the General Contractor or electrical subcontractor at his expense. Every temporary lamp outlet must be properly lamped throughout the construction; dark or burned-out lamps shall be immediately replaced.
- F. Wiring of contractors' offices, trailers, storage facilities, and equipment used during construction, shall be the responsibility of the General Contractor or the electrical subcontractor.

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- G. Where a contractor requires the use of energy at places other than those herein specified or of an amount greater than would be available from the specified temporary service, the contractor shall make independent arrangements with the General Contractor or electrical subcontractor for the service at his own expense.
- H. When permanent facilities are approved by the Architect and Owner as ready for operation, they may be used for temporary light and power. The General Contractor shall arrange with the utility for removal of the temporary metering and shall bear the cost involved in the changeover.
- I. Upon approval of use and completion of the changeover to the permanent system, the General Contractor or electrical subcontractor shall remove the temporary electrical service, including power and lighting, distribution and utilization, equipment and wiring.

## 1.17 TEMPORARY HEATING - PRIOR TO BUILDING ENCLOSURE

- A. The building shall not be considered enclosed until the permanent specified building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.
- B. The General Contractor, until the building is enclosed, shall provide heating for all materials to afford protection of water bearing material against injury by frost or freezing and to permit construction to continue and progress uninterrupted. The General Contractor shall maintain such temporary heating until danger of frost or freezing has past.
  - 1. The General Contractor shall also be required to install temporary coverings over windows and other openings to retain the heat.
- C. Salamanders and electric heaters will not be permitted; however, portable direct fired heaters, fired with LP gas, kerosene, #1, or #2 fuel oil will be allowed. When such heaters are employed, the contractor shall observe safety precautions necessary; and in no case shall LP gas fired heaters be used in low places of construction, such as pits, tunnels, etc., which can collect heavier than air gas or fumes. Portable heaters must be UL approved.
- D. Equipment producing carbon monoxide shall not be used where fumes will contact freshly placed concrete or mortar.
- E. The General Contractor shall pay for fuel, maintenance, and related costs for these units until the permanent building is enclosed. Temporary heating equipment shall be subject to the approval of the Architect.

## 1.18 TEMPORARY HEATING - AFTER BUILDING ENCLOSURE

- A. The building shall be considered enclosed when the permanent specified building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.

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- B. Heating required after enclosure of the additions or designated portion thereof shall be done by the General Contractor or mechanical subcontractor. Temporary heating facilities shall have adequate capacity based upon the following:
1. When incorporating special materials into the construction, maintain space temperatures in strict accordance with the manufacturer's instructions.
  2. The following temperatures shall be maintained: 50 degrees minimum during working and non-working hours. For a period of 14 days prior to interior finishing (painting, resilient tile, acoustical ceilings, etc.) and until final acceptance or occupancy by the Owner, spaces shall be kept 60 degrees F. minimum.
  3. Maintain constantly in heated areas when the space temperature is once raised above 60 degrees F., a minimum space temperature of 60 degrees F. to prevent thermal shock to the structure.
  4. Preheat materials in accordance with manufacturer's instructions and accepted trade practice.
- C. After the building or designated portion have been enclosed and temporary heat is required, as directed by the Architect, the General Contractor or mechanical subcontractor shall provide temporary heat using the following method:
1. Use of the Permanent Heating System
    - a. The permanent heating system may be used for temporary heating where available and if approved by the Architect and Owner. If the permanent system is used, the General Contractor or mechanical subcontractor shall have installed in their permanent location such fan systems, heating coils, convectors, etc., as approved by the Architect. Provide necessary insulated piping to the enclosed space when the boiler is remotely located.
    - b. Temporary filters shall be used in the permanent system. Provide bases, shields, etc., around heating elements where required to prevent too rapid drying of adjacent concrete, masonry, or plaster. Some of the permanent heating system equipment may require relocation by the HVAC Subcontractor as required during construction, to prevent interference with continuing construction, where authorized by the Architect. Equipment so used shall be cleaned and restored to new conditions except for ordinary wear, prior to final acceptance, and its use shall in no way negate the Owner's one year warranty specified to commence on the date of Substantial Completion.
    - c. If the permanent system is not fully operable or does not have sufficient controls to maintain the necessary heat in light of existing conditions, the General Contractor or mechanical subcontractor shall furnish, install, and maintain temporary units connected to the permanent system. Each unit shall be installed complete with safety controls, venting, power and fuel connections, room thermostat and necessary ductwork, and piping approved by the Architect. Portions of the temporary heating system shall be removed by the General Contractor or mechanical subcontractor after they are no longer necessary. The temporary heating equipment shall be relocated by the General Contractor or mechanical subcontractor as required during construction to prevent interference with continuing construction.

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- d. The start of the warranty on the permanent heating equipment and system(s) will not start until Substantial Completion is issued for complete HVAC Base Bid Work.
- D. The cost of fuel and energy used for the operation of the temporary heating system after the building is enclosed shall be paid for by the General Contractor.
  - 1. Beginning at the Date of Substantial Completion, the Owner will pay the cost of utilities and heating, HVAC. If portions of the building are occupied with a temporary Certificate of Occupancy by legal jurisdiction, prior to the completion of the entire facility, the Owner will pay utility usage charges based on a mutually agreed upon prorated square foot basis.

## 1.19 VENTILATION - AFTER BUILDING ENCLOSURE

- A. The General Contractor shall provide and pay for ventilation of the enclosed space as needed for their own workmen in accordance with applicable laws. Contractor shall also provide ventilation of the enclosed space as required to facilitate drying of plaster, poured decks and floors, or other materials requiring ventilation in accordance with manufacturer's directions.
- B. If the permanent ventilation system is used, the General Contractor shall assume full responsibility for maintenance of the permanent equipment and shall keep the system clean, furnish and change filters as needed, and turn the complete new heating-ventilation system over to the Owner in a clean condition when the project is completed. Permanent equipment shall not be used for temporary ventilation unless maintained and operated as follows:
  - 1. Return air ducts shall not be used.
  - 2. Supply air to reach unit shall be filtered.
  - 3. Filters shall be constantly checked and changed when necessary.
  - 4. Operation of permanent equipment for ventilation shall not negate the Owner's one year warranty specified to commence on the date of Substantial Completion.
  - 5. Provide MERV filters in all ventilation equipment if allowed to be used during construction. Replace with specified filters just prior to substantial completion.

## 1.20 TEMPORARY CONSTRUCTION FENCE

- A. The General Contractor shall provide a 8'-0" temporary chain-link construction fence to completely surround the contractor's staging areas and the building construction.
- B. Posts for the temporary construction fence shall be temporarily installed but shall be of a permanent type of installation to keep vehicles and unauthorized personnel out of the project site work areas.
- C. Temporary chain-link fence shall surround the entire building site. Refer to the Site Plan.
- D. Chain-link construction fence may be new or used.

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- E. Lockable vehicle gates will be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 50 00

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SECTION 01 56 00  
TEMPORARY PROTECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This section specified requirements for protection.
- B. Protection facilities required include but are not limited to:
  - 1. Barricades, warning signs, lights.

### 1.2 QUALITY ASSISTANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
  - 1. Building Code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, Fire Department and Rescue Squad rules.
  - 5. Environmental protection regulations.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
  - 1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
  - 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect each disconnected utility. Obtain required certifications and permits.

## PART 2 -PRODUCTS

### 2.1 EQUIPMENT

- A. First Aid Supplies: Comply with governing regulations.
- B. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers for NFPA recommended classes for the exposure.

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1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

## PART 3 - EXECUTION

### 3.1 PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
  1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.
  3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
- B. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- C. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

END OF SECTION 01 56 00

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SECTION 01 60 00  
PRODUCTS, MATERIALS, AND EQUIPMENT

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. The Work of this Section shall be included as a part of the Contract Documents of each contractor on this Project.

### 1.2 SUMMARY

- A. It is the intent of the Specifications and Drawings to accomplish a complete and first-grade installation in which there shall be installed new materials and products of the latest and best design and manufacturer. Workmanship shall be thoroughly first-class and complete, executed by competent and experienced workmen.
- B. Equipment, specialties, and similar items shall be checked for compliance and fully approved prior to installation. Contractors are cautioned that work or equipment installed without approval is subject to condemnation, removal, and subsequent replacement with an approved item without extra compensation.

### 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structures," "finishes," "accessories," and similar terms. Such terms and definitions are self-explanatory and have well recognized meanings in the construction industry.
  - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
    - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature that is current as of the date of the Contract Documents.
    - b. "Foreign Products", as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside of the United States and its possessions; or produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens or nor living within the United States and its possessions.
  - 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
  - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

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## PART 2 - PRODUCTS

### 2.1 PRODUCT STANDARD AND QUALITY - SUBSTITUTIONS

- A. The Contract is based on the materials, equipment, and methods described in the Contract Documents.
1. All product manufacturers for panel walls, exterior doors, roofing products, skylights, windows, shutters, structural components and products comprising a building's envelope introduced as a result of new technology, whether or not listed or specified, shall comply with Rule 9B-72 of the Florida Administrative Code and shall comply with the 2007 Florida Building Code with the 2009 Supplement.
  2. If certain manufacturers listed are not approved, the product manufacturer shall be responsible to obtain approvals in accordance with Rule 9B-72 of the Florida Administrative Code prior to submitting product data or shop drawings for this project. Otherwise, if not approved by the State, the manufacturer will not be acceptable for use on this project.
- B. Where in the Drawings and Specifications certain products, manufacturer's tradenames, or catalog numbers are given, it is done for the expressed purpose of establishing a basis of design, quality, durability, and efficiency of design in harmony with the work outlined and is not intended for the purpose of limiting competition.
- C. The Architect will consider proposals for substitutions of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitution.
- D. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this Work by the Architect.
- E. "Or equal":
1. Where the phrase "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this Work by the Architect.
  2. The decision of the Architect shall be final.
- F. Availability of Specified Items:
1. Verify prior to bidding that specified items will be available in time for installation during orderly and timely progress of the Work.
  2. In the event specified item or items will not be so available, so notify the Architect prior to receipt of bids.
  3. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the contractor, will be back charged as necessary and shall not be borne by the Owner.

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- G. Where the questions of appearance, artistic effect, or harmony of design are concerned, the Architect reserves the right to refuse approval of substituted products proposed to be substituted for that specified, if in his opinion the item to be substituted is not harmonious to the finished effect and appearance desired, as portrayed in the Drawings and Specifications. The Architect's said refusal to approve, established by this paragraph, is final and not subject to arbitration.
- H. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval and complete technical data for evaluation must be received at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

## 2.2 MANUFACTURER'S DIRECTIONS

- A. Manufactured products shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the manufacturer' printed directions, unless herein specified to the contrary. Where manufacturer's printed directions are available and where reference is made to manufacturer's directions in the Specification, the contractor shall submit 2 copies of such directions to the Architect prior to the beginning of Work covered thereby.
- B. Where specific installation instructions are not part of these Specifications and Drawings, equipment shall be installed in strict accordance with instructions from the respective manufacturers. Where installation instructions included in these Specifications or Drawings are at a variance with instructions furnished by the equipment manufacturer, the contractor shall make written request for clarification from the Architect.
- C. In accepting or assenting to the use of apparatus or material, or make, or arrangement thereof, the Architect in no way waives the requirements of these specifications or the warranty embodied therein.

## 2.3 WARRANTIES

- A. Specific warranties or bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in General Conditions, shall be furnished in accordance with the requirements of the Specifications.
- B. Each contractor shall and does hereby agree to warrant for a period of one year, or for longer periods, where so provided in the Specifications, as evidenced by the date of Substantial Completion issued by the Architect, products installed under the Contract to be of good quality in every respect and to remain so for periods described herein.

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- C. Should defects develop in the aforesaid Work within the specified periods, due to faults in products or their workmanship, the contractor hereby agrees to make repairs and do necessary Work to correct defective Work to the Architect's satisfaction, in accordance with the Supplementary Conditions. Such repairs and corrective Work, including costs of making good other Work damaged by or otherwise affected by making repairs or corrective Work, shall be done without cost to the Owner and at the entire cost and expense of the contractor within 14 days after written notice to the contractor by the Owner.
- D. Nothing herein intends or implies that the warranty shall apply to Work which has been abused or neglected or improperly maintained by the Owner or his successor in interest.
- E. Where service on products is required under this Article, it shall be promptly provided when notified by the Owner and no additional charge shall be made, unless it can be established that the defect or malfunctioning was caused by abuse or accidental damage not to be expected under conditions of ordinary wear and tear.
- F. In the event movement in the adjoining structure or components causes malfunctioning, the contractor responsible for the original installation of the adjoining structure or components shall provide such repair, replacement, or correction necessary to provide for proper functioning to bring the equipment back into the same operating condition as approved at the completion of the building.
- G. The manufacturer and supplier expressly warrants that each item of equipment furnished by him and installed in this Project is suitable for the application shown and specified in the Contract documents and includes features, accessories, and performing characteristics listed in the manufacturer's catalog in force on the date bids are requested for the Work. This warranty is intended as an assurance by the manufacturer that his equipment is not being misapplied and is fit and sufficient for the service intended. This warranty is in addition to and not in limitation of other warranties or remedies required by law or by the Contract Documents. It shall be the responsibility of the contractor for the particular equipment to obtain this warranty in writing.
- H. In case the contractor fails to do Work so ordered, the Owner may have work done and charge the cost thereof against monies retained as provided for in the Agreement and, if said retained monies is available, the contractor and his Sureties shall agree to pay to the Owner the cost of such Work.

## 2.4 MATERIAL DELIVERY AND RESPONSIBILITIES

- A. Each contractor shall be responsible for materials he orders for delivery to the jobsite. Responsibility includes, but is not limited to, receiving, unloading, storing, protecting, and setting in place; ready for final connections. Each contractor will coordinate jobsite storage with the Design-Builder.
  - 1. The Owner will not be responsible for deliveries related to the construction or operation of the contractor. The Owner cannot sign delivery forms for the contractor.

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- B. Contractors shall insure that products are delivered to the Project in accordance with the Construction Schedule of the Project. In determining date of delivery, sufficient time shall be allowed for shop drawings and sample approvals, including the possibility of having to resubmit improperly prepared submittals or products other than those specified and the necessary fabrication or procurement time along with the delivery method and distance involved.

## 2.5 PROTECTION

- A. Each contractor shall protect building elements and products when subject to damage. Should workmen or other persons employed or commissioned by one contractor be responsible for damage, the entire cost of repairing said damage shall be assumed by said individual contractor. Should damage be done by a person or persons not employed or commissioned by a contractor, the respective contractors shall make repairs and charge the cost to the guilty person or persons. The affected contractors shall be responsible for collecting such charges. If the person or persons responsible for damage cannot be discovered, full and satisfactory repairs shall be made by the respective contractor, and the cost of Work shall be prorated against each contractor.
- B. The respective contractors shall protect their products prior to installation and final acceptance. Storage shall be dry, clean, and safe. Materials or equipment damaged, deteriorated, rusted or defaced due to improper storage, shall be repaired, refinished, or replaced, as required by the Architect. Products lost through theft or mishandling shall be replaced by the contractor without cost to the Owner.

## 2.6 ACCEPTANCE OF EQUIPMENT OR SYSTEMS

- A. The Owner will not accept the start of the warranty period on systems or equipment until Substantial Completion is issued to the respective contractor(s) for Owner's occupancy of the building, in part or whole. Each contractor shall make such provisions as required to extend the manufacturer's warranty from time of initial operation of systems or equipment until Substantial Completion is given in writing.

## PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

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SECTION 01 60 10  
PRODUCT SUBSTITUTIONS

## PART 1 - GENERAL

### 1.1 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
  - 1. Revisions to Contract Documents requested by the Owner or Architect.
  - 2. Specified options of products and construction methods included in Contract Documents.
  - 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

### 1.2 SUBMITTALS

- A. Substitution Request Submittal: Request for product substitution shall be submitted to the Architect no later than ten (10) days prior to bid due date. Requests received after this time may not be considered.
  - 1. Substitutions after the bid date may be accepted and will be reviewed on a case-by-case basis.
- B. Contractor's Substitution Request Form: Submit substitution requests to the Architect (through Design-Builder) on the "Contractor Substitution Request Form" attached at the end of this Section.
- C. Substitutions shall include product data, samples and shop drawings as required to evaluate the proposed product. Submittals shall also include specified product (some additional engineering may be required with specific materials) with a line-by-line comparison of the products.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Owner when one or more of the following conditions are satisfied, as determined by the Owner; otherwise requests will be returned without action except to record noncompliance with these requirements.
  - 1. Extensive revisions to Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of Contract Documents.

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3. The request is timely, fully documented and properly submitted.
  4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
  5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
  6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
  8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
  9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
  10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
- C. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

## PART 3 - EXECUTION (NOT USED)

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## CONTRACTOR'S REQUEST FOR SUBSTITUTION

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_

SPECIFICATION SECTION: \_\_\_\_\_ ITEM(S): \_\_\_\_\_

SPECIFIED MANUFACTURER: \_\_\_\_\_

SPECIFIED MODEL NO: \_\_\_\_\_

PROPOSED MANUFACTURER: \_\_\_\_\_

\_\_\_\_\_

PROPOSED MODEL NO: \_\_\_\_\_

REASON/S FOR \_\_\_\_\_

\_\_\_\_\_

REQUEST FOR \_\_\_\_\_

\_\_\_\_\_

SUBSTITUTION \_\_\_\_\_

\_\_\_\_\_

Attach complete technical data, including laboratory tests, if applicable, in duplicate.

A. Will approval affect dimensions shown on Drawings in any way? No \_\_\_\_\_ Yes \_\_\_\_\_  
Explain (Attach drawings if necessary): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

B. Will the Contractor pay for any changes to the building design, including engineering and detailing costs caused by the approval? No \_\_\_\_\_ Yes \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

C. Will approval affect the work of other trades? No \_\_\_\_\_ Yes \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

D. Manufacturer's guarantees of the proposed and specified items are: Same \_\_\_\_\_ Different \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

E. Does the proposed item meet all applicable Codes, Ordinances and regulations for this specific application? No \_\_\_\_\_ Yes \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

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F. Has proposed item been used locally in similar applications? No \_\_\_\_\_ Yes \_\_\_\_\_  
Explain: \_\_\_\_\_  
\_\_\_\_\_

G. If approved, will the Owner receive a credit for the proposed alternate material? No \_\_\_\_\_ Yes \_\_\_\_\_  
Explain: \_\_\_\_\_  
\_\_\_\_\_

H. Does the proposed alternate material meet the same applicable standards (ASTM, ANSI, UL, FS.)  
as the specified item? No \_\_\_\_\_ Yes \_\_\_\_\_  
Explain: \_\_\_\_\_  
\_\_\_\_\_

It is the Contractor's responsibility to provide all information necessary to determine the proposed alternate material is equal or better than the specified item. This includes any test reports, product data, manufacturer's specifications, color samples, product samples or the like as may be required for an evaluation.

The Architect and Owner will not be required to prove any product is not equal or suitable to the Project.

SUBMITTED BY: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

FOR ARCHITECT'S USE:

Not Acceptable \_\_\_\_\_

No Exceptions Taken \_\_\_\_\_

By: \_\_\_\_\_

Date: \_\_\_\_\_

END OF SECTION 01 60 10

# Downtown Bradenton Transit Station

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SECTION 01 60 20  
FLORIDA PRODUCT APPROVAL FORM

## PART 1 - GENERAL

### 1.1 FLORIDA PRODUCT APPROVAL FORM

**Location:** \_\_\_\_\_ **Project Name:** \_\_\_\_\_

As required by Florida Statute 553.842 and Florida Administrative Code 9B-72, please provide the information and the product approval number(s) on the building components listed below if they will be utilized on the construction project for which you are applying for a building permit on or after November 22, 2006. We recommend you contact your local product supplier should you not know the product approval number for any of the applicable listed products. More information about statewide product approval can be obtained at [www.floridabuilding.org](http://www.floridabuilding.org)

Category/Subcategory	Manufacturer	Product Description	Approval Number(s)
<b>A. EXTERIOR DOORS</b>			
1. Swinging			
2. Sliding			
3. Sectional			
4. Roll up			
5. Automatic			
6. Other			
<b>B. WINDOWS</b>			
1. Single hung			
2. Horizontal Slider			
3. Casement			
4. Double Hung			
5. Fixed			
6. Awning			
7. Pass-through			
8. Projected			
9. Mullion			
10. Wind Breaker			
11. Dual Action			
12. Other			
13. Other			
<b>C. PANEL WALL</b>			
1. Siding			
2. Soffits			
3. EIFS			
4. Storefronts			
5. Curtain walls			
6. Wall louver			

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7. Glass block			
8. Membrane			
9. Greenhouse			
10. Other			
<b>D. ROOFING PRODUCTS</b>			
1. Asphalt Shingles			
2. Underlayments			
3. Roofing Fasteners			
4. Non-structural Metal Roof			
5. Built-Up Roofing			
6. Modified Bitumen			
7. Single Ply Roofing System			
8. Roofing Tiles			
9. Roofing Insulation			
10. Waterproofing			
11. Wood shingles /shakes			
12. Roofing Slate			
13. Liquid Applied Roof System			
14. Cements-Adhesives – Coatings			
15. Roof Tile Adhesive			
16. Spray Applied Polyurethane Roof			
17. Other			
<b>E. SHUTTERS</b>			
1. Accordion			
2. Bahama			
3. Storm Panels			
4. Colonial			
5. Roll-up			
6. Equipment			
7. Others			
<b>F. SKYLIGHTS</b>			
1. Skylight			
2. Other			
<b>G. STRUCTURAL COMPONENTS</b>			
1. Wood connector/anchor			
2. Truss plates			
3. Engineered lumber			
4. Railing			
5. Coolers-freezers			
6. Concrete Admixtures			
7. Material			

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8. Insulation Forms			
9. Plastics			
10. Deck-Roof			
11. Wall			
12. Sheds			
13. Other			
14. Other			
<b>H. NEW EXTERIOR ENVELOPE PRODUCTS</b>			
1.			
2.			

The products listed below did not demonstrate product approval at plan review. I understand that at the time of inspection of these products, the following information must be available to the inspector on the jobsite; 1) copy of the product approval, 2) the performance characteristics which the product was tested and certified to comply with, 3) copy of the applicable manufacturers installation requirements.

I understand these products may have to be removed if approval cannot be demonstrated during inspection.

Product Name	Manufacturer

Contractor or Contractor's Authorized Agent Signature	Print Name	Date
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Site Address	Permit #
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SECTION 01 70 00  
PROJECT CLOSEOUT

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Closeout is hereby defined to include general requirements near the end of Contract Time in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the work. Specific requirements for individual parts of the Work are specified in Sections of Divisions 2 through 49. Time of closeout is directly associated to Date of Substantial Completion.

### 1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. Prior to requesting Architect review for Certificate of Substantial Completion, (for either entire Work or portions thereof), complete the following and list known exceptions in request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, agreements, final certifications, and other required closeout documents.
  - 3. Obtain and submit release enabling Owner's full and unrestricted use of the Work and access to services and utilities, including occupancy permits, operating certificates, and other similar required releases.
  - 4. Deliver tools, spare parts, extra stocks of materials, and similar physical items as specified to the Owner. Obtain receipts for deliveries.
  - 5. Make final changeover of locks and transmit keys to Owner and advise Owner's personnel of changeover in security provisions.
  - 6. Complete start-up testing of systems and instruction of Owner's operating/maintenance personnel. Discontinue and remove from project site temporary facilities and service, construction tools and facilities, mock-ups, and other construction elements.
  - 7. Complete final cleaning up requirements as specified in Section 01 74 13.

### 1.3 PREREQUISITES TO FINAL PAYMENTS

- A. Prior to requesting Architect final review for certification of final payment, complete the following:
  - 1. Refer to the Supplementary Conditions.
  - 2. Submit final payment request with required closeout attachments.
  - 3. Submit copy of Architect's final punch list of itemized Work to be completed or corrected, stating that each and every item has been completed or otherwise resolved for acceptance.
  - 4. Submit record drawings, maintenance manuals, and similar final record information as specified.

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5. Submit certification of code compliance.
6. Submit certification stating that no materials containing asbestos were incorporated into the Work.
7. Plumbing Contractor shall submit certification stating that no flux or solder used for drinking water piping containing more than 0.2 percent lead, and that no pipe or fittings used for drinking water piping contained no more than 0.8 percent lead.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 PUNCH LIST

- A. Prior to the Architect's preparation of a Project Punch List, each Contractor shall prepare his own punch list and submit to the Architect and General Contractor, for use by the Architect to facilitate completion of the Work.
- B. The Contractor's inspection shall be as thorough as possible, in accordance with his aspiration to provide first-class workmanship and maintain good reputation and shall include Work under his Contract, including that of his subcontractors.
- C. The Architect shall observe the Work, providing that the Work on the Contractor's punch list has been completed, and prepare the Project Punch List for use by Contractors and their subcontractors to expedite proper completion of the Work.
- D. The Architect will only perform two (2) punch list inspections. The Architect will do the first inspection prior to issuing the Substantial Completion certificate and will do a second inspection within 30 days of the first inspection to verify that the contractor has completed the outstanding items on the first inspection punch list. Additional inspections above and beyond as specified herein are at additional cost to the Contractor and the cost of such additional inspections will be deducted from the Contract by Change Order.

### 3.2 WARRANTY - CORRECTION OF THE WORK

- A. Architect will check to see if additional Work by the Contractor(s) is needed to make good the warranties. An itemized list will be furnished to the Contractor for corrective or replacement work.
  1. At approximately one month prior to the one year warranty expiration, the Owner, Architect, and a representative of the Contractor shall visit the site and prepare the warranty punch-list.
- B. This Work shall be completed immediately by the Contractor(s) after receiving notification.

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## 3.3 PROJECT RECORD DRAWINGS

- A. Each Contractor shall keep current during the progress of the Work, and submit updated Project Record Drawings at the completion of the project, especially for the purpose on this project. Drawings shall incorporate changes made in the Work of the respective trades during the construction period. Such changes shall be indicated at the time they occur for accuracy.
- B. Maintain at the job site one copy of Drawings, Project Manual, Addenda, approved shop drawings, change orders, field orders, other Contract modifications, and other approved documents submitted by the Contractor(s), in compliance with various Sections of the Project Manual.
- C. Each of these Project Record Documents shall be clearly marked "Project Record Copy"; maintained in good condition; available for observation by the Architect; and shall not be used for construction purposes. Mark up the documents to indicate the following:
  - 1. Significant changes and selections made during the construction process;
  - 2. Significant detail not shown in the original Contract Documents including change orders;
  - 3. The location of underground utilities and appurtenances dimensionally referenced to permanent surface improvements;
  - 4. The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structure;
  - 5. When elements are placed exactly as shown on the Drawings, so indicate; otherwise, indicate changed location.
- D. Keep Project Record Documents current. Do not permanently conceal Work until the required information has been recorded.
- E. Prior to final payment on the Project, submit to the Architect the Project Record Drawings for changes recorded for the Work of Divisions 2 through 14.
- F. Prior to final complete and payment, the Contractors for Mechanical Work and Electrical Work, Divisions 21 through 28, shall update their working drawings with changes made in his Work. Submit one complete set of transparencies and 2 complete sets of prints of these changed working drawings to the Architect.
  - 1. Each drawing shall be labeled "Project Record Drawing", dated and signed by the Contractor.
- G. The Contractor shall certify that the Project Record Drawings show complete and accurate as-built conditions, including without limitation, sizes, kinds of materials, vital piping and valves, conduit locations, and other similar and required items.
- H. Contractor(s) shall include as part of the Project Record Drawings, a complete and current Project Manual, indicating changes made relating to the specifications. All requirements for the Project Record Drawings apply to the Project Record Project Manual.

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- I. The Contractor shall maintain all approved Permit Drawings in a manner so as to make them accessible to governmental inspectors and other authorized agencies. All approved Drawings shall be wrapped, marked, and delivered to the Owner within 10 days of the Date of Substantial Completion of the Work.

## 3.4 CERTIFICATION OF CODE COMPLIANCE

- A. Prior to final payment, the contractor indicated below shall submit to the Architect (in duplicate), letters of certification of code compliance as follows:
  1. The Subcontractor(s) for Division 22, 23, 24, Mechanical Work, shall submit a letter certifying that mechanical installations comply with current applicable Codes.
  2. The Subcontractor(s) for Division 26, 27, 28 Electrical Work, shall submit letters certifying that electrical wiring complies with NEC current applicable editions.
  3. The Subcontractor for Division 26, 27, 28, Electrical Work, shall submit letters certifying that alarm systems and smoke and heat detection systems comply with State of Indiana Codes and Regulations, current applicable conditions.

## 3.5 MAINTENANCE AND OPERATING MANUALS

- A. Prior to Date of Substantial Completion, and a requirement prior to receiving final payment, each Contractor shall submit to the Architect three (3) copies of a comprehensive Maintenance and Operating Manual presenting complete directions and recommendations for the proper care and maintenance of visible surfaces as well as maintenance and operating instructions for equipment items which he has provided. Operation and Maintenance Manuals shall include the following:
  1. Schematic and piping and wiring diagrams.
  2. Valve charts and schedules.
  3. Lubrication charts and schedules.
  4. Guides for troubleshooting.
  5. Pertinent diagrams of equipment with main parts identification.
  6. Manufacturer's data on all equipment.
  7. Operating and maintenance instructions for all equipment.
  8. Manufacturer's parts list.
  9. Any testing procedures for operating tests.
- B. Operating instructions shall include necessary printed directions for correct operations, adjustments, servicing, and maintenance of movable parts. Also included shall be suitable parts lists, approved shop drawings, and diagrams showing parts location and assembly.
- C. Upon Architect's approval and prior to issuance of final payment(s), each contractor shall submit three (3) corrected and completed copies of Operating and Maintenance Manuals to the Architect.
- D. Finished manuals shall be loose-leaf type with hardboard covers and titled tabs identifying each particular portion or item of the Work.

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- E. For each titled item or portion of the Work, manual must provide the names, addresses, and phone numbers of the following parties:
  - 1. Contractor/installer
  - 2. Manufacturer
  - 3. Nearest dealer/supplier
  - 4. Nearest agency capable of supplying parts and service
  
- F. For each manual label on front cover or spine, indicate the following information:
  - 1. Project name and address
  - 2. Owner's name
  - 3. Name and address of Architect
  - 4. Name and address of all contractors and their contacts
  - 5. Date of submission
  
- G. The contractor(s) shall instruct the Owner's operating personnel in the proper use, care and emergency repair of all equipment installed before final payment. The contractor(s) shall call particular attention to any safety measures that should be followed. The instruction shall be adequate to train the Owner's operating personnel in the proper use, care, and emergency repair of such equipment.
  
- H. Refer to Section 01 30 00 for additional requirements.

## 3.6 CHARTS AND LOCATIONS OF CONCEALED WORK

- A. The contractor(s) for Mechanical Work shall prepare suitable charts identifying and locating each concealed control or other concealed item requiring repair, adjustment, and maintenance. Charts shall be mounted in suitable frames with glass covers secured to wall where directed.
  
- B. Charts shall list each item, together with its function, item number and location.
  
- C. Locations throughout the building shall be identified on the wall or ceiling by permanent, non-obstructive plates, labels, or other approved means secured in a permanent manner.
  
- D. Chart details, identification methods, locations, and methods of attachment shall be specified or approved by the Architect at the jobsite upon full submission of proposed procedures and proper execution of same.

END OF SECTION 01 70 00

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SECTION 01 71 23  
FIELD ENGINEERING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. General: This Section specifies administrative and procedural requirements for field engineering services, including, but not necessarily limited to, the following:
  - 1. Land survey Work.
  - 2. Civil engineering services.
  - 3. Structural engineering services.

### 1.2 SUBMITTALS

- A. Certificates: Submit a certificate signed by the Land Surveyor or Professional Engineer certifying that the location and elevation of improvements comply with the Contract Documents.
- B. Final Property Survey: Submit 10 copies of the final property survey.
- C. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections 01 33 00, Submittals, and 01 70 00, Project Closeout.

### 1.3 QUALITY ASSURANCE

- A. Surveyor: Engage a Registered Land Surveyor registered in the State where the project is located, to perform land surveying services required.
- B. Engineer: Engage a Professional Engineer of the discipline required, registered in the state in which the Project is located, to perform required engineering services.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. The Owner will identify existing control points and property line corner stakes.
- B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

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1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
  2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
- C. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- D. Existing utilities and equipment: 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 and other construction.
1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

## 3.2 PERFORMANCE

- A. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
1. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
  2. As construction proceeds, check every major element for line, level and plumb.
- B. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.
1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
  2. On completion of foundation walls, major site improvements, and other Work requiring field engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and sitework.
- C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.

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- D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.
- E. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.
- F. Final Property Survey: Before Substantial Completion, prepare a final property survey showing significant features (real property) for the Project. Include on the survey a certification, signed by the Surveyor, to the effect that principal metes, bounds, lines and levels of the Project are accurately positioned as shown on the survey.
  - 1. Recording: At Substantial Completion, have the final property survey recorded by or with local governing authorities as the official "property survey".

END OF SECTION 01 71 23

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SECTION 01 73 29  
CUTTING AND PATCHING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 1. Requirements of this Section apply to plumbing/mechanical and electrical installations. Refer to Divisions 22, 23 and 26 Sections, respectfully, for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- C. Demolition of selected portions of the building for alterations is included in Section 02 41 13, Selective Demolition.
- D. Cutting and patching shall be the responsibility of the contractor (trade) requiring the cutting and patching.

### 1.2 SUBMITTALS

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal to the Architect describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
  - 3. List products to be used and firms or entities that will perform Work.
  - 4. Indicate dates when cutting and patching is to be performed.
  - 5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  - 6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
  - 7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

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## 1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
1. Obtain approval from the Architect and Engineer of the cutting and patching proposal before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Structural concrete.
    - d. Structural steel.
    - e. Lintels.
    - f. Timber and primary wood framing.
    - g. Structural decking.
    - h. Stair systems.
    - i. Miscellaneous structural metals.
    - j. Exterior curtain wall construction.
    - k. Equipment supports.
    - l. Piping, ductwork, vessels and equipment.
    - m. Structural systems of special construction in Division-13.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
    - a. Shoring, bracing, and sheeting.
    - b. Primary operational systems and equipment.
    - c. Air or smoke barriers.
    - d. Water, moisture, or vapor barriers.
    - e. Membranes and flashings.
    - f. Fire protection systems.
    - g. Noise and vibration control elements and systems.
    - h. Control systems.
    - i. Communication systems.
    - j. Conveying systems.
    - k. Electrical wiring systems.
    - l. Special construction specified by Division-13 Sections.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
1. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

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- a. Processed concrete finishes.
- b. Stonework and stone masonry.
- c. Ornamental metal.
- d. Matched-veneer woodwork.
- e. Preformed metal panels.
- f. Window wall system.
- g. Stucco and ornamental plaster.
- h. Acoustical ceilings.
- i. Terrazzo.
- j. Finished wood flooring.
- k. Fluid-applied flooring.
- l. Carpeting.
- m. Aggregate wall coating.
- n. Wall covering.
- o. Swimming pool finishes.
- p. HVAC enclosures, cabinets or covers.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
  - 1. Before proceeding, meet at the 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.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

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- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

## 3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
  - 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
  - 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

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- a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
  4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- D. Plaster Installation: Comply with manufacturer's instructions and install thickness and coats as indicated.
1. Unless otherwise indicated provide 3-coat Work.
  2. Finish gypsum plaster with smooth-troweled finish. Sand lightly to remove trowel marks and arises.
  3. Cut, patch, point-up and repair plaster to accommodate other construction and to restore cracks, dents and imperfections.

### 3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

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SECTION 01 74 13  
CONSTRUCTION CLEANING

## PART 1 - GENERAL

### 1.1 RELATED WORK

- A. The Work of this Section shall be included as a part of the Contract Documents of each Contractor of this Project.

### 1.2 SUMMARY

- A. The Architect reserves the right to act on behalf of the Owner pertaining to the clean-up responsibilities that are a part of each Contractor's Work.

### 1.3 PURPOSE - DAILY CLEANING

- A. Define and emphasize the responsibility of each Contractor to remove his rubbish and debris from the construction site to guard against fire and safety hazards as well as to provide a more efficient construction operation for all Contractors. If this cleaning is not performed to the satisfaction of the Owner and the Architect, it will be performed for the Contractor at his expense.

### 1.4 PURPOSE - ROUTINE CLEANING

- A. Each Friday afternoon, and more often if necessary, each Contractor shall perform an overall cleanup of the entire site, including a broom cleaning of appropriate surfaces. The trades shall remove their rubbish and debris from the building site to the rubbish collection location promptly upon its accumulation and in no event later than the regular Friday general cleanup.

### 1.5 RUBBISH CONTAINER

- A. The Prime Contractor shall provide dumpster type rubbish container with lid, sized adequate for the Project waste, debris, and rubbish for the life of the Project.
- B. Dispose of container contents weekly or at more frequent intervals if required by inadequate container capacity.

### 1.6 SAFETY REQUIREMENTS

- A. Hazards Control (By each Contractor)
  - 1. Store volatile wastes in covered metal containers, and remove from the premises daily.
  - 2. Prevent accumulation of wastes, which create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.

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- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Do not burn or bury rubbish and waste materials on project site.
  - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 3. Do not dispose of wastes into streams or waterways.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surface recommended by cleaning material manufacturer.

## PART 3 - EXECUTION

### 3.1 DAILY CLEANING

- A. Each Contractor shall execute daily cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. Daily, during progress of work, clean site and public properties and dispose of waste materials, debris, and rubbish in dumpster type rubbish container provided under this Section.
- D. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- E. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- F. Place no new work on dirty surfaces.

### 3.2 ROUTINE CLEANING

- A. Employ experienced workmen for cleaning.
- B. Remove dirt, mud, and other foreign materials from sight exposed interior and exterior surfaces.
- C. Each Friday, or at more frequent intervals, if work activities justify same, perform the following cleaning. This includes all dirt, dust, and debris not identifiable as part of a Contract. Broom clean floor and paved surfaces; rake clean other surfaces of ground.

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- D. Maintain adjacent roads free from the accumulation of mud, rocks, rubbish, litter and debris resulting from construction activities.
- E. Remove litter, rubbish and debris from chases, whether the chases will be accessible or not.
- F. Maintain cleaning throughout the life of the Project.
- G. Should the Contractor fail in the performance of this Work, the Owner may perform such Work in accordance with Article 3 of the General Conditions.

## 3.3 FINAL CLEANING (Each Contractor)

- A. Each Contractor shall perform his respective final clean-up and shall leave the Work of the complete Project in clean, neat condition. The following are examples, but not by way of limitation, of cleaning levels required.
  - 1. Remove labels which are not required as permanent labels.
  - 2. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.
  - 3. Clean exposed exterior and interior hard surfaces to a dirt free condition, free of dust, stains, films, and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
  - 4. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.
  - 5. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - 6. Clean concrete floors in nonoccupied spaces broom clean.
  - 7. Vacuum clean carpeted surfaces and similar soft surfaces.
  - 8. Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure.
  - 9. Clean food service equipment to a condition, free of stains, including those resulting in water exposure.
  - 10. Clean light fixtures and lamps so as to function with full efficiency. Replace all lamps that are burnt out and/or flickering.
  - 11. Clean project site (yard and grounds), including landscape development areas, of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, petro-chemical spills, and other foreign deposits. Rake grounds which are neither planted nor paved to a smooth, even textured surface.

END OF SECTION 01 74 13

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SECTION 01 74 15  
PEST CONTROL (DURING CONSTRUCTION)

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide treatment for pest control, as herein specified.
  - 1. Apply to all interior floor to wall corners and around building perimeter at existing grades during construction.

### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and application instructions in accordance with Division 01 requirements.
- B. Submit specific product warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate application.
- B. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.
- C. Use only chemicals that bear a Federal registration number of the U.S. Environmental Protection Agency.

### 1.4 SPECIFIC PRODUCT WARRANTY

- A. Furnish written warranty, certifying that applied insecticide treatment will prevent infestation of common household insects such as cockroaches, ants, and fleas. If insect activity is discovered during warranty period, Contractor will re-treat.

## PART 2 - PRODUCTS

### 2.1 PEST CONTROL SOLUTION

- A. Use an emulsible concentrated insecticide for dilution with water, specially formulated to prevent infestation by insects. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements and concentrations:
  - 1. "Demon", by Zenica, Wilmington, Delaware.
  - 2. Home Defense Indoor Insect Killer 5, Bifenthrin by The Solaris Group, San Ramon, California

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- B. Other solutions may be used as recommended by Applicator if also acceptable to Architect and approved for intended application by jurisdictional authorities. Use only insecticide treatment solutions that are not injurious to planting.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Surface Preparation: Remove foreign matter that could decrease treatment effectiveness on areas to be treated.
- B. Application Rates: Mix chemicals (from sealed containers) with water, at the job-site, then apply concentrate solution only at rates described by the manufacturer on the product label and in compliance with State of Florida laws.
- C. Post signs in areas of application to warn workers that insecticide treatment has been applied. Remove signs when areas are covered by other construction.
- D. Re-apply concentrate solution to areas disturbed by construction activities following application.
- E. Applicator shall mix all treatment on-site and mixing shall be witnessed by the Owner's representative.
- F. The applicator shall treat all buildings on a frequency of once per month starting when the building is dried in with windows, doors and roofing in place. The last two treatments shall be applied at substantial completion and at 30 days after substantial completion.
- G. Applicator shall treat all interior spaces of buildings including but not limited to each side of bottom of interior walls, interior side of exterior walls, bottom of vinyl bases, Perimeter of windows, bottom of exterior side of exterior wall, and any other areas/ openings on exterior side of building.

END OF SECTION 01 74 15

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## SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

### PART 1 - GENERAL

#### 1.1 WASTE MANAGEMENT GOALS FOR THE PROJECT

- A. This Project shall minimize the creation of construction and demolition waste on the job site. Factors that contribute to waste, such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination, shall be minimized. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.
- B. Diversion Goals: A minimum 50% of total Project waste shall be diverted from landfill. Records shall be kept to attempt for verification. The following waste categories, at a minimum, shall be diverted from landfill:
1. Land-clearing debris
  2. Clean dimensional wood, pallet wood
  3. Plywood, OSB, and particleboard
  4. Concrete
  5. Bricks
  6. Concrete Masonry Units (CMU)
  7. Asphaltic concrete
  8. Electrical wiring
  9. Cardboard, paper, packaging
  10. Aluminum
  11. Steel
  12. Gypsum drywall (unpainted)
  13. Paint
  14. Glass
  15. Plastics
  16. Carpet and pad
  17. Beverage containers

#### 1.2 REFERENCES, RESOURCES

- A. *WasteSpec*, Triangle J Council of Governments, PO Box 12276, Research Triangle Park, NC 27709
- B. California Integrated Waste Management Board, 916/255-2296, e-mail: opa@ciwmb.ca.gov

#### 1.3 WASTE MANAGEMENT PLAN

- A. Produce and submit a Waste Management Plan. The Plan shall contain the following:
1. Estimate of total Project waste to be generated, name of the landfill(s) where Project waste would normally be disposed of, tipping fees, and estimated cost of disposing of Project waste in landfill(s).

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- a. Provide the name of the landfill(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).
  - b. Identify licensed haulers and processors of recyclables for categories of materials to be separated.
2. Estimate of total tons of the following waste category to be diverted from landfill:
    - a. Concrete
    - b. Asphaltic Concrete
    - c. Brick
    - d. Other
  3. Estimate of total cubic yards of the following waste categories to be diverted from landfill:
    - a. Clean dimensional wood, pallet wood
    - b. Plywood, OSB, and particleboard
    - c. Cardboard, paper, packaging
    - d. Other
  4. Estimate of amounts (weight, feet, square yards, gallons, etc.) of the following waste categories:
    - a. Aluminum
    - b. Steel
    - c. Copper
    - d. Carpet
    - e. Paint
    - f. Other
  5. Estimate of net cost savings or additional costs resulting from separating and recycling (versus landfilling) each material. "Net" means that the following have been subtracted from the cost of separating and recycling:
    - a. Revenue from the sale of recycled or salvaged materials
    - b. Landfill tipping fees saved due to diversion of materials from the landfill

## 1.4 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used at the appropriate stages of the Project.
- B. Conduct Construction Waste Management meetings.
- C. Separation Facilities: Designate a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid commingling of materials. Bins shall be protected during non-working hours from off-site contamination.
  1. Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in order to prevent contamination of materials and to maximize recyclability and salvageability of identified materials.

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- D. Materials Handling Procedures: Materials to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets the requirements set by the designated facilities for acceptance.
- E. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials. Provide an estimate of how often bins will need to be emptied.
- F. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.
  - 1. Recycle any thermostats to be discarded to Thermostat Recycling Corporation (703) 841 3249 or [www.nema.org/trc](http://www.nema.org/trc)
- G. Application for Progress Payments: Submit with each Application for Progress Payment a Summary of the Project waste generated. Failure to submit this information may render the Application for Payment incomplete and may delay Progress Payment. The Summary shall contain the following information:
  - 1. The amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost. Include manifests, weight tickets, receipt, and invoices.
  - 2. For each material recycled, reused, or salvaged from the Project, include the amount (in tons or cubic yards, pounds, feet, square yards, gallons, etc.), the date removed from the job site, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of salvage or recycling each material. Attach manifests, weight tickets, receipts, and invoices.

PART 1 - PRODUCTS (Not Used)

PART 2 - EXECUTION (Not Used)

END OF SECTION 01 74 19

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SECTION 01 78 33  
WARRANTIES AND BONDS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
  - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
  - 2. General closeout requirements are included in Section 01 70 00, Project Closeout.
  - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 02 through 33.
  - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

### 1.3 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

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## 1.4 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

## 1.5 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
  - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen days of completion of that designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.

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- C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Architect for approval prior to final execution.
  - 1. Refer to individual Sections of Divisions 02 through 33 for specific content requirements, and particular requirements for submittal of special warranties.
- D. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the installer.
  - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.
  - 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 SCHEDULE OF WARRANTIES

- A. General Contractor shall submit to the Architect a Schedule of Warranties.

END OF SECTION 01 78 33

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**Division 02**  
Existing Conditions



PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.
- B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the Engineer.
- C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.
- D. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

1.2 QUALITY ASSURANCE

- A. Testing Agency:
  - 1. In place soil compaction tests shall be performed by a qualified testing laboratory.
  - 2. Compaction tests shall be taken every 500 feet, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.
- B. Reference Standards:
  - 1. American Society for Testing and Materials (ASTM):
    - a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

1.3 JOB CONDITIONS

- A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.
- B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.
- C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the Engineer.

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- D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and County regulation.
  - E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the trench shall be refilled with suitable material.

## PART 2 - PRODUCTS

### 2.1 MATERIAL FOR CONTROLLED FILL

- A. Composition: Only approved material free from organic matter and lumps of clay, shall be used for backfill. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.
- B. Crushed stone and shell shall meet or exceed current FDOT Standards.

### 2.2 UNSUITABLE MATERIAL

Unsuitable material shall be defined as highly organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. The Contractor shall verify that work preceding the affected work of this Section has been satisfactorily completed.
- B. Conditions adversely affecting the work of this Section shall be corrected to the satisfaction of the Engineer.

### 3.2 REMOVAL OF UNSUITABLE MATERIALS

- A. The Contractor shall remove unsuitable material from within the limits of the Work.
- B. Materials meeting requirements for controlled fill shall be stockpiled as necessary and in such a manner satisfactory to the Engineer.
- C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

### 3.3 EXCAVATION

- A. When concrete or shell subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.
- B. When any structural excavation is completed, the Contractor shall notify the Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer.

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- C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the Engineer may order in writing, such changes in dimensions or elevations of the footings and slab base as necessary to secure satisfactory foundations.
  - D. All excavation shall be made within an area bounded by lines five feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted.
  - E. If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil before continuing concreting operations.
  - F. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Engineer and if so directed, replaced by crushed stone or washed shell.

#### 3.4 STRUCTURAL BACKFILL

- A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling.
- B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings if required by the engineer.
- C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 98 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the Engineer. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Engineer.
- D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the Engineer: the backfill material is of such character that it will be self-draining when compacted; foundation materials will not soften or be otherwise damaged by the applied water; no damage from hydrostatic pressure will result to the structure. Ponding and jetting within two feet below finished subgrade shall not be permitted in roadway areas. At the discretion of the Engineer, ponding and jetting may be permitted with compaction layers not to exceed four feet.
- E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

#### 3.5 BACKFILLING AROUND STRUCTURES

- A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wetted down as required. Where

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material can be suitably compacted by jetting or puddling, the Contractor may use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.

- B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the Engineer.
- C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot above the bottom of the pipes:
  - 1. Place structural fill in such areas for a distance of not less than three feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
  - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.
  - 3. Structural fill shall be of the quality specified under Part 2 of this Section.
- D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.
- E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

### 3.6 FIELD QUALITY CONTROL

- A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

END OF SECTION 02 22 20

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall finish grade sub-soil.
- B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.
- C. The Contractor shall place, finish grade and compact top soil.

1.2 PROTECTION

The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the Owner.

PART 2 - PRODUCTS

Topsoil: Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 - EXECUTION

3.1 SUB-SOIL PREPARATION

- A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the Engineer.
- B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks.
- C. The Contractor shall bring sub-soil to required profiles and contour grades gradually; and blend slopes into level areas.
- D. The Contractor shall slope the structure grade a minimum of two (2) inches in ten (10) feet unless indicated otherwise on the Drawings.
- E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has compacted sub-soil.
- F. The Contractor shall not make grade changes which causes water to flow onto adjacent lands.

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3.2 PLACING TOPSOIL

- A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be performed. He shall place from the following minimum depths, up to finished grade elevations:
  - 1. 6 inches for seeded areas
  - 2. 4-1/2 inches for sodded areas
  - 3. 24 inches for shrub beds
  - 4. 18 inches for flower beds
- B. The Contractor shall use topsoil in a dry state as determined by the Engineer. He shall place the material during dry weather.
- C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.
- D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.
- E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.
- F. The Contractor shall lightly compact and place the topsoil.

3.3 SURPLUS MATERIAL

- A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.
- B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION 02 22 60

PART 1 - GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish and install shoring and sheeting as necessary to provide adequate safety.

PART 2 - PRODUCTS

2.1 MATERIALS

Wood for shoring and sheeting shall be green, rough cut hardwood planking.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall furnish, install and maintain sheeting and bracing required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below which is necessary for proper construction and to protect adjacent structures from undermining or other damage. If the Engineer determines that insufficient or improper supports have been provided, he may order additional supports to be installed at the expense of the Contractor. Compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting. Should voids form, they shall be immediately filled and rammed.
- B. The Contractor shall embed and leave in place all sheeting, bracing and other related items as shown on the Contract Drawings. The Owner/Engineer may direct that sheeting and bracing timber be cut off at a specified elevation. No additional payment or compensation shall be made for this work.
- C. Sheeting and bracing not left in place shall be removed carefully in such manner as not to endanger other structures, utilities, property, or proposed construction.
- D. The Owner/Engineer may order sheeting and bracing to be left in place; however, this shall not relieve the Contractor from liability for damages to persons or property due to negligence or the failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
- E. The Contractor shall receive no payment other than that included in the pipe bid item price for any timber used for sheeting bracing, or other related items.

END OF SECTION 02 23 55



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PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, material, equipment and incidentals necessary for complete installation of chain link fence systems. The fencing shall be installed according to manufacturer's specifications unless otherwise directed or authorized by the Owner/Engineer.
- B. The Contractor's security fencing is at his expense and option and is not covered in this Section.

1.2 QUALITY ASSURANCE

- A. Standards of Manufacture shall comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.
- B. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including, but not limited to accessories, fittings, fasteners and appurtenances complete and ready for use.
- C. Acceptable Manufacturers: Anchor, Cyclone, or approved equal
- D. Erector Qualifications: The Contractor or approved subcontractor, must have a minimum of two years experience in similar fence installation.

1.3 SUBMITTALS

- A. Product Data:

For Steel Fences and Gates, the Contractor shall submit for review and approval to the Owner/Engineer, five (5) copies of the manufacturer's technical data, details of fabrication, installation instructions and procedures for steel fences and gates. The Contractor shall be responsible for a copy of each instruction to be given to the Installer.

- B. Samples:

The Contractor shall submit two samples approximate size 6-inches long, or 6-inches square of fabric material, framework members and typical accessories to the Owner/Engineer for review and approval.

- C. Certificates:

The Contractor shall provide manufacturer's certification that materials meet or exceed the Contract Document requirements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The pipe sizes indicated are commercial pipe sizes.
- B. The tube sizes indicated are nominal outside dimension.

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- C. Framework and appurtenances shall be finished with not less than minimum weight of zinc per sq. ft. and shall comply with the following:
    - 1. Pipe: ASTM A53 (1.8 oz. zinc psf)
    - 2. Square tubing: ASTM A 123 (2.0 oz. zinc psf)
    - 3. Hardware and Accessories: ASTM A 153 (zinc weight per Table I).
  - D. All fence components shall be galvanically compatible.
  - E. Vinyl coatings for fabric, posts, rails, gates, and all other fittings and components shall be thermally fused polyvinyl chloride; heavy mil coating per ASTM F 668.

## 2.2 FABRIC

Fabric shall be 0.148 inch (9 gage) steel wire, 2-inch diamond mesh and both top and bottom salvages shall be twisted and barbed for fabric over 60-inches high. Finish shall be hot dipped galvanized, ASTM A 392, Class II.

## 2.3 POSTS, RAILS AND BRACES

- A. End, Corner and Pull Posts:
  - 1. The Contractor shall furnish end, corner and pull posts of the minimum size and weight as follows:
    - a. Up to 5 foot fabric height
      - (1) 2.375-inch OD pipe weighing 3.65 pounds per linear ft.
      - (2) 2.50-inch square tubing weighing 5.59 pounds per linear foot.
    - b. Over 5 foot fabric height
      - (1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.
      - (2) 2.50-inch square tubing weighing 5.59 lbs. per linear foot.
- B. Line Post:
  - 1. The Contractor shall furnish line posts of the minimum sizes and weight as follows. Post shall be spaced 10 foot o.c. maximum, unless otherwise indicated:
    - a. Up to 5 foot fabric height.
      - (1) 1.90-inch OD pipe weighing 2.72 pounds per linear foot.
    - b. Over 5 foot fabric height.
      - (1) 2.375-inch OD pipe weighing 3.65 pounds per linear foot.
- C. Gate Posts:
  - 1. The Contractor shall furnish gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:
    - a. Up to 6 feet wide.
      - (1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.
      - (2) 2-1/2 inch square tubing weighing 5.59 pounds per linear foot.
    - b. Over 6 feet and up to 13 feet wide.
      - (1) 4-inch OD pipe weighing 9.11 pounds per linear foot.
    - c. Over 13 feet and up to 18 feet wide.
      - (1) 6.625 inches OD weighing 18.97 pounds per linear foot.
    - d. Over 18 feet.
      - (1) 8.625 inches OD weighing 28.55 pounds per linear foot.

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- D. Top Rails:
1. The Contractor shall furnish the following top rails unless otherwise indicated:
    - a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.
- E. Post Brace Assembly:
1. The Contractor shall furnish bracing assemblies at the end, gate, at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric.
  2. Use 1.660-inch OD pipe weighing 2.27 pounds per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckles for diagonal truss.
- F. Tension Wire:
1. The Contractor shall furnish tension wire consisting of galvanized 0.177 inch (7 gage) coiled spring wire as per ASTM A824 at the bottom of the fabric only.
- G. Barbed Wire Supporting Arms:
1. The Contractor shall furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be attached either to posts or integral with post top weather cap. The Contractor shall provide a single 45 degree arm for each post where indicated.
- H. Barbed Wire:
1. The Contractor shall furnish barbed wire. It shall be 2 strand, 12-1/2 gauge wire with 14 gauge, 4-point barbs spaced 5-inch o.c., galvanized, complying with ASTM A121, Class 3.
- I. Post Tops:
1. The Contractor shall furnish post tops. Tops shall be pressed steel, wrought iron, or malleable iron of ASTM F626 designed as a weathertight closure cap (for tubular posts). The Contractor shall furnish one cap for each post unless equal protection is afforded by a combination of post top cap and barbed wire supporting arm. The Contractor shall furnish caps with openings to permit through passage of the top rail.
- J. Stretcher Bars:
1. The Contractor shall furnish stretcher bars. Bars shall be one piece lengths equal to the full height of the fabric, with a minimum cross-section of 3/16-inch x 3/4-inch. The Contractor shall provide one stretcher bar for each gate and end post and two bars for each corner and pull post, except where fabric is integrally woven into the post.
- K. Stretcher Bar Bands:
1. The Contractor shall furnish stretcher bar bands. Bands shall be steel, wrought iron, or malleable iron, a maximum space of 15-inch o.c. to secure stretcher bars to end, corner, pull and gate posts.

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2.4 GATES

- A. The Contractor shall provide fabricated gate perimeter frames of tubular members. Additional horizontal and vertical members shall ensure proper gate operation and attachment of fabric, hardware and accessories. The maximum space of the frame members shall not be more than 8-inches apart. Fabrication is as follows:
1. Up to 5 feet high, or leaf width 8 feet or less.
    - a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.
    - b. 1.5 inch sq. tubing weighing 2.27 pounds per linear foot.
  2. Over 5 feet high, or leaf width exceeding 8 feet.
    - a. 1.90 inch OD pipe weighing 2.72 pounds per linear foot.
    - b. 2-inch square tubing weighing 2.60 pounds per linear foot.
- B. The Contractor shall assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. He shall use the same fabric width as for the fence, unless otherwise indicated in the Contract Documents or authorized by the Owner/Engineer. He shall install the fabric with stretcher bars at vertical edges. The bars may also be used at the top and bottom edges. The contractor shall attach stretchers to the gate frame at a maximum spacing of 15-inch o.c. He shall attach the hardware with rivets or by other means which will prevent removal or breakage.
- C. The Contractor shall install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates as necessary to ensure frame rigidity without sag or twist.
- D. The Contractor shall install barbed wire above the gates. He shall extend the end members of gate frames 12-inches above the top member which will be prepared for three strands of wire. The Contractor shall provide necessary clips for securing wire to extensions.
- E. Gate Hardware:
1. The Contractor shall furnish the following hardware and accessories for each gate.
    - a. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1-1/2 pair of hinges for each leaf over six feet nominal height.
    - b. Latch: Forked type of plunger-bar type to permit operation from either side of gate with padlock eye as integral part of latch.
    - c. Keeper: Provide keeper for all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
    - d. Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete to engage the center drip drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.
    - e. Where gates are between masonry piers, provide "J" with 4-inch square anchor plate to masonry contractor for building in.

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2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Wire Ties: The Contractor shall tie fabric to line posts. He shall use 9 gauge wire ties spaced 12-inches o.c. For tying fabric to rails and braces, he shall use 9 gauge wire ties spaced 24-inches o.c. For tying fabric to tension wire, he shall use 11 gauge hog rings spaced 24-inches o.c. The finish of ties shall match the fabric finish.
- B. Concrete: The Contractor shall provide portland cement concrete in compliance with ASTM C-150 and the Contract Documents. Aggregates shall comply with ASTM C-33. The Contractor shall mix the materials to obtain a minimum 28-day compressive strength of 2500 psi, using a minimum of 4 sacks of cement per cubic yard, a maximum size aggregate of 1-inch, a maximum 3-inch slump and air entrainment of 2 percent to 4 percent.
- C. Privacy Decorative Slatting (PDS) shall be PVC, bottom locking, non-fin type, sized to match the fabric height and color in both the fence and gates.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall not start the fence installation prior to the final grade completion, and the finish elevations established, unless otherwise authorized by the Owner/Engineer.
- B. The Contractor shall repair damaged coatings in the shop or in the field by recoating utilizing manufacturers recommended repair compounds and as applied per manufacturer's recommendations.
- C. Excavation:
  - 1. For post footings, the Contractor shall drill holes in firm, undisturbed or compacted soil of the diameters and spacings shown or called out in the Contract Documents.
    - a. For holes not shown or called out on the Contract Documents, the Contractor shall excavate minimum diameters recommended by the fence manufacturer.
    - b. Post holes shall be in true alignment and of sufficient size to provide a permanent concrete foundation. Concrete shall be poured against undisturbed earth sides and bottom. All holes shall be 48-inches deep with posts and corner posts placed in the concrete to a depth of 36-inches. The gate posts shall be set in the concrete to a depth of 42-inches below the surface in firm, undisturbed soil. Holes shall be well centered on the posts. A minimum diameter of 12-inches shall be required for all post holes.
    - c. Excavated soil shall be removed from the Owner's property.
    - d. If solid rock is encountered near the surface, the Contractor shall drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner or gate posts. Hole shall be drilled to at least 1-inch greater diameter than the largest dimension of the post to be place.
    - e. If the Contractor encounters solid rock below solid overburden, he shall drill to the full depth required; however, rock penetration need not exceed the minimum depths specified.

D. Setting Posts:

1. The Contractor shall remove loose and foreign materials from the sides and bottoms of holes, and moisten soil prior to placing concrete.
  - a. Center and align posts in holes above bottom of excavation.
  - b. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. The top of concrete shall extend 2-inches above finish grade.
  - c. Trowel finish tops of footings and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.
  - d. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method.
  - e. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

E. Concrete Strength:

The Contractor shall allow the concrete to attain at least 75% of its minimum 28-day compressive strength no sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. The Contractor shall not stretch and tension fabric or wires and shall not hang gates until the concrete has attained its full design strength.

F. Top Rails:

The Contractor shall run the rail continuously through post caps or extension arms and bend to radius for curved runs. He shall provide expansion coupling as recommended by fencing manufacturer.

G. Brace Assemblies:

The Contractor shall install braces so that posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:

The Contractor shall install tension wires by weaving through the fabric and tying to each post with not less than 0.170 inch galvanized wire, or by securing the wire to the fabric.

I. Fabric:

The Contractor shall leave approximately 3-inches between finish grade and bottom salvage, except where the bottom of the fabric extends into the concrete. He shall pull the fabric taut and tie it to posts, rails and tension wires. He shall install fabric on the security side of the fence and anchor it to the framework so that the fabric remains in tension after the pulling force is released.

J. Stretcher Bars:

The Contractor shall thread through or clamp the bars to the fabric 4-inches o.c. and secure them to posts with metal bands spaced 15-inches o.c.

K. Barbed Wire:

The Contractor shall install 3 parallel wires on each extension arm on the security side of fence, unless otherwise indicated. He shall pull the wire taut and fasten securely to each extension arm.

L. Gate:

The Contractor shall install gates plumb, level and secure for full opening without interference. He shall install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. He shall adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:

The Contractor shall use U-shaped wire, conforming to the diameter of the attached pipe, and shall clasp the pipe and fabric firmly with twisted ends of at least 2 full turns. He shall bend the end of the wire to minimize hazard to persons or clothing.

N. Fasteners:

The Contractor shall install nuts for tension band and hardware bolts on the side of fence opposite the fabric side. Pen ends of bolts or score threads to prevent removal of nuts.

3.2 INSTALLATION

A. Fence shall be constructed such that each run of fence between corner posts or gate posts has equal spacing between the line posts. Spacing shall not exceed 10 feet, and shall not exceed 8 feet for fabric with privacy decorative slatting.

END OF SECTION 02 24 44



PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.
- B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by Engineer/Owner.

1.2 RELATED WORK NOT INCLUDED

Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.3 QUALITY ASSURANCE

- A. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the Owner until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.
- B. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fertilizer: The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.
- B. Seeding/Grassing: The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

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- C. Sodding: Sod shall be provided as required on the construction drawings or at locations as directed by the Engineer in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract price bid for sodding.
  - D. Topsoil: Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the Owner. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.
  - E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the Engineer.
- B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The Engineer shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.
- C. Protection: Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the Owner shall be repaired by the Contractor as directed by the Engineer.

#### 3.2 CLEANUP

Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

#### 3.3 LANDSCAPE MAINTENANCE

- A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the Engineer.
- B. Maintain landscape work for a period of 90 days immediately following complete installation of work or until Owner accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the Owner.

3.4 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and sodding, in accordance with these Specifications.

END OF SECTION 02 24 85



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PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.
- B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.
- C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.
- D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe installed underground shall be poly wrapped unless noted otherwise on the plans.

1.2 SUBMITTALS

- A. The Contractor shall submit to the Engineer, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.
- B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Ductile iron pipe shall conform to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51. Thickness of pipe shall be Class 50 or pressure Class 350. All pipe not buried shall be Class 53. All ductile iron pipe shall be clearly marked on the outside of the barrel to readily identify it from cast iron.
- B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 feet. Unless otherwise called for in the Contract Documents, unrestrained joint pipe shall be either the rubber-ring type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or approved equal.
- C. All fittings shall be pressure rated for 350 psi and meet the requirement of AWWA C110 or AWWA C153. Rubber gaskets shall conform to ANSI A21.11 for mechanical and push-on type joints for diameters up to 14" diameter. Gaskets for 16" diameter and larger pipe shall be EPDM (Ethylene-Propylene Dine Monomer) such as the "Fastite Gasket" of American Ductile Iron Pipe Co., or approved equal.
- D. Water Mains: All ductile iron pipe and fittings shall have a standard thickness cement lining on the inside in accordance with AWWA/ANSI C104/A21.4 and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. All interior linings shall be EPA/NSF approved.

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- E. Force Main Fittings: All ductile iron fittings shall have a factory applied fusion bonded epoxy or epoxy and polyethylene lining on the inside in accordance with manufacturer's specifications and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. The interior lining is to be based on manufacturer's recommendation for long-term exposure to raw sewage. It shall have a minimum ten year warranty covering failure of the lining and bond failure between liner and pipe.
  - F. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures: 350 psi for pipe sizes up to and including 24" diameter; 250 psi for pipe sizes 30" diameter and above.

## 2.2 IDENTIFICATION

- A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.
- B. Pipe shall be poly wrapped blue for potable water mains, purple for reclaimed water mains and green for sewage force mains. All potable water pipe shall be NSF certified and copies of lab certification shall be submitted to the Engineer.

END OF SECTION 02 26 15

PART 1 - GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to clean and disinfect potable water pipe lines. This work is required to place all types of pipe into service as potable water lines.

1.2 CLEANING WATER MAINS

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipes to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period per Section 02618.

1.3 DISINFECTING POTABLE WATER PIPE LINES

- A. All record drawing requirements must be submitted to the Owner/Engineer prior to starting the bacteriological testing of the water lines.
- B. Prior to being placed in service, all potable water pipe lines shall be chlorinated in accordance with AWWA 651, "Standard Procedure for Disinfecting Water Main". The procedure shall meet Health Department requirements. The location of the chlorination and sampling points shall be determined by the Engineer. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.
- C. The general procedure for chlorination shall be to flush all dirty or discolored water from the lines, then introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipe line for 24 hours.

Water for flushing, filling and disinfecting the new lines must be obtained without contaminating existing pipe lines. Water obtained from existing pipe lines for this purpose shall pass through an approved air gap or backflow prevention device.

- D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by an approved laboratory or the Health Department in full accordance with the AWWA Manual C651. The line shall not be placed in service until the requirements of the State and County Public Health Department are met. Results of the bacteriological tests together with certified record drawings must be submitted to the Health Department (FDEP) within 30 days of the tests.
- E. Special disinfecting procedures when approved by the County, may be used where the method outlined above is not practical.

END OF SECTION 02 26 16



PART 1 - GENERAL

1.1 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install all pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents by Horizontal Directional Drilling (HDD).

1.2 GENERAL

- A. All existing structures, water and sewer lines, storm drains, utilities, driveways, sidewalks, signs, mail boxes, fences, trees, landscaping, and any other improvement or facility in the construction area that the Contractor disturbs for his own construction purposes shall be replaced to original condition at no additional cost to the County.
- B. For "Navigable Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 329.
- C. For "Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 323.
- D. For "Waters of the State" reference Section 62-301 of the Florida Administrative Code.

1.3 TESTING

- A. In place soil compaction tests shall be performed by a qualified testing laboratory.
- B. Compaction tests shall be taken at every excavation, except in the road crossings or road shoulders; tests are to be taken according to current FDOT Standards.
- C. All pipe shall be tested in accordance with the appropriate material specifications.
- D. Reference Standards: American Society for Testing and Materials (ASTM), D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18-in. Drop.
- E. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

1.4 QUALIFICATIONS

- A. Pipe Manufacture: All pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.
- B. Drilling Supervisor: The Contractor shall provide a competent boring specialist who shall remain on the project site during the entirety of the directional boring operation. This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five years experience in supervising directional bores of similar nature, diameter, materials and lengths.
- C. Pipe Fusion: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for performing such work or a minimum of five years experience performing this type of work. If no certification is available, written documentation of the required work experience shall be submitted for approval.

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- D. Drilling Fluid Specialist: The personnel responsible for supervising the supply, mixing, monitoring fluid quality, pumping and re-circulation system proposed for the drilling fluid shall have a written certification issued by the Drilling Fluid manufacturer for performing such work or a minimum of five years experience performing this type of work. If no certification is available, written documentation of the required work experience for the proposed personnel shall be submitted for review and approval.

1.5 SUBMITTALS

- A. Detailed description including specifications and catalog cuts for:
1. Shop drawings and catalog data for all HDD equipment.
  2. The pipe manufacturer's maximum degree of radial bending allowed for the pipe when full and when empty and pullback force recommended setting.
  3. Steering and tracking devices including specific tracer wire.
  4. Drilling fluids; the drilling fluid submittal shall include the ratio of mixture to water, including any additives, based on the Contractor's field observations prior to construction, knowledge and experience with drilling in similar conditions, and any soil data provided in the Contract Documents, which shall be verified by the fluid specialist.
  5. Shop drawings for the breakaway swivel, including the method of setting the swivels' break point and set point to be used.
  6. Pipe assembly procedure, details of support devices, and staging area layout including methods to avoid interference with local streets, driveways, and sidewalks.
  7. Details of pipe fusion procedures and copies of the fusion technician qualification certification or documentation.
  8. Drilling fluid technician qualification certification or documentation
- B. If the Contractor proposes any changes to the pull-back distance or profile shown on the drawings, he may be required to submit a complete design for the proposed pipe including an analysis for pull-back forces, external loads including full hydrostatic pressure if empty, external forces due to borehole collapse, ovalization during pull-back, thermal stress while exposed to Sun-light, shortening after release of pull-back force, and tensile stress during pull-back.
- C. Bore Plan: For all contiguous piping installations over 300 feet in length or any installations for piping larger than 4" in diameter, the Contractor shall submit a Bore Plan that includes the following:
1. Contact information and experience for the drilling fluid specialist.
  2. The number of passes the bore will include to get the product pipe installed.
  3. The pilot bore and all reaming bore sizes including the final pullback with the product pipe.
  4. Drilling rod length in feet.
  5. The pilot bore, pre-ream bores (if any) and pullback production rate in minutes per (drilling) rod to maintain adequate mud flow.
  6. Details of the entry and exit pit locations along with entry and exit angles for the bore, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.
  7. The method of fusing or joining pipe of adjacent bores to ensure that the joint is on grade with the installed pipe.

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- D. Furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Data collected by the County Representative does not relieve the Contractor from the responsibility of recording his own data. Include the following in the report:
1. Location of project, project name and number
  2. Name of person collecting data, including title, position and company name
  3. Investigation site location (Contract plans station number or reference to a permanent structure within the project right-of-way)
  4. Driller's Log & identification of the detection method used
  5. Elevations and offset dimensions of installed pipe as referenced to the drawings
  6. Data log of pullback force during product pipe installation
  7. All failed bores. Include length of pipe left in place and explanation of failed installation.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.
- B. Drilling Fluids shall use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a pH of 8.5 to 10.0 to create the drilling fluid for lubrication and soil stabilization. Vary the fluid viscosity to best fit the soil conditions encountered. Contractor shall have appropriate additives for drilling fluid available for different soil conditions that may be encountered. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer. Certify to the Engineer in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the product pipe.
- C. For drilling operations that will be below waters of the State of Florida, only bentonite free drilling fluids shall be used. Acceptable products are BioMax, manufactured by M-I Swaco, Inc., P.O. Box 2216, Laurel, Mississippi 39440, Phone: (800) 731-7331 or Bio-Bore, manufactured by Baroid Drilling Fluids, Inc., P.O. Box 1675, Houston, Texas 77251, Phone: (731) 987-5900 or approved equal.
- D. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH test.
- E. The tracer wire to be used for all directional drills shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.
- F. Breakaway connectors shall be supplied by DCD Design & Manufacturing, Condux International, Inc. or approved equal.

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**PART 3 - EXECUTION**

**3.1 SITE CONDITIONS**

- A. Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation, unless approved by the Engineer.
- B. Within 48 hours of completing installation of the boring product, clean the work site of all excess slurry or spoils. Take responsibility for the removal and final disposition of excess slurry or spoils. Ensure that the work site is restored to pre-construction conditions or as identified on the plans.
- C. Exposure of product pipe to sunlight shall be limited to 14 consecutive days unless approved by the Engineer.
- D. The pipe shall be supported at intervals along its length with rollers or Teflon pads to minimize frictional forces when being pulled, and to hold the pipe above the ground. Surface cuts or scratches greater than or equal to the maximum defect depth in 3.08 E are not acceptable.

**3.2 DAMAGE RESTORATION & REMEDIATION**

- A. The Contractor shall take responsibility for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the County.
- B. When required by the Engineer, provide detailed plans which show how damage to any roadway facility will be remedied. These details will become part of the Record Drawings Package. Remediation Plans must follow the same guidelines for development and presentation of the Record Drawings. When remediation plans are required, they must be approved by the Engineer before any work proceeds.
- C. For HDD operations that will be below waters of the State of Florida, the contractor shall be responsible for any damage caused by the drilling operation, including, but not limited to, fracturing of the channel bottom. Any State or Federal required environmental cleanup due to the release of drilling fluids into State waters shall be at the Contractor's expense. The Contractor may at his own expense increase the depth of his drilling operations upon the approval from the Engineer.

**3.3 QUALIFICATIONS FOR REJECTION OF DIRECTIONAL BORE**

- A. The Engineer may reject any portion of the work that is deemed to be non-responsive to the Contract requirements or not in conformance with approved plans and submittals, and for other factors including the following:
  - 1. Failed Bore: When there is any indication that the installed product has sustained damage, stop all work, notify the County and investigate damage. The County may require a pressure and / or mandrel test at no additional cost to the County and shall have a County representative present during the test. Perform all testing within 24 hours unless otherwise approved by the Engineer. Furnish a copy of the test results and all bore logs to the Engineer for review and approval. The Engineer is allowed up to 5 working days to approve or determine if the product installation is not in compliance with the specifications.

2. Obstructions: If an obstruction is encountered during boring which prevents completion of the installation in accordance with the design location and specification, the pipe may be taken out of service and left in place at the discretion of the Engineer.
  3. Pull-back Failure: If the installed breakaway device should fail during pull back.
  4. Loss of Drilling Fluids: If the drilling fluid is "lost" during the pull back of the product and can not be regained within the required timeframe of the manufacturer or if more than a reasonable amount of fluid is used to fill an unknown void and flow can not be regained. No pipe shall be pulled without visible flow of drilling fluid.
  5. Test Failure: If the pipe shall fail a hydraulic pressure test as specified by the County.
  6. Damaged Pipe: If at any time when the product is pulled back and any exposed areas have a greater than allowable "gouging" or visible marring of the pipe per the table in 3.08 E.
  7. Alignment Tolerance Exceeded: If the vertical and horizontal limits are not within tolerances.
  8. Defective Material: Any other defect in material or workmanship which would affect the quality, performance, or installation life of the installed pipeline.
- B. Remediation: All rejected bores shall be at the Contractors expense to correct and provide a satisfactory installed product. The Contractor shall submit to the Engineer a revised installation plan and procedure for approval before resuming work. The Engineer may require non-compliant installations to be filled with excavatable flowable fill or to be completely removed at no additional cost to the County.

#### 3.4 PRODUCT LOCATING AND TRACKING

- A. The County recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer, as the accepted methods of tracking directional bores. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:
1. Clock and pitch information
  2. Depth
  3. Transmitter temperature
  4. Battery status
  5. Position (x,y)
  6. Azimuth, where direct overhead readings (walkover) are not possible (i.e. sub aqueous)
- B. Ensure proper calibration of all equipment before commencing directional drilling operation.
- C. Prepare the Driller's Log. Take and record alignment readings or plot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the Engineer. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of 10 feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product.

- D. Installation Location Tolerances: The location of the initial bored hole shall be deemed acceptable by the Engineer if the deviations of the bore from the design alignment or approved adjustments do not exceed the following tolerances:
1. Profile:
    - a. 2.0 feet within a length of 100 feet
    - b. No reverse curvature within 200 feet
    - c. Total deviation not to exceed 5 feet
  2. Alignment:
    - a. 3.0 feet within a length of 200 feet
    - b. No reverse curvature
    - c. Total deviation not to exceed 7.0 feet

**3.5 PRODUCT BORE HOLE DIAMETER**

Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches	Bit Diameter Inches
2	4
3	6
4	8
6	10
8	12
10	16
12 and greater	Maximum Product OD plus 6

**3.6 EQUIPMENT REQUIREMENTS**

- A. The HDD equipment selected by the Contractor shall be capable of drilling, steering, tracking, reaming and installing the pipeline through all the subsurface conditions that may be present at the site.
- B. Match equipment to the size of pipe being installed. Obtain the Engineer's approval for installations differing from the above chart. Ensure that the drill rod can meet the bend radius required for the proposed installation.
- C. All HDD equipment shall have a data logger to record pull back force during all pipe installations.
- D. All HDD equipment that has the capability to exceed the maximum recommended pulling force shall have a breakaway swivel properly attached to the product pipe that will release if the pullback force exceeds the pipe manufacturers recommended pulling force.

**3.7 THRUST / PULLBACK REQUIREMENTS**

The Contractor shall provide as part of the required working drawings submittal complete data regarding the operational and maximum thrust or pulling forces to be used for the initial drill head and back-reamer installations, and the final pull-back of the pipe. Gages or other measurement tools shall be used to monitor the forces being used.

3.8 INSTALLATION PROCESS

- A. Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the Engineer's approval of the location and all conditions necessary to construct relief holes to ensure the proper disposition of drilling fluids is maintained and unnecessary inconvenience is minimized to other facility users.
- B. The Contractor shall determine the pull-back rate in order to allow the removal of soil cuttings without building excess down-hole pressure and to avoid local heaving, or spills. Contain excess drilling fluids at entry and exit points until they are recycled and separated from excavated materials, or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits and storage tanks are of sufficient size to contain the expected return of drilling fluids and soil cuttings. The bored hole shall always be maintained full of drilling fluids for support of surfaces, and the fluid re-circulation equipment shall operate continuously until the pipe installation is completed and accepted by the Engineer.
- C. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. Remove any excess material upon completion of the bore. If in the drilling process it becomes evident that the soil is contaminated, contact the Engineer immediately. Do not continue drilling without the Engineer's approval.
- D. The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole.
- E. All prepared pipe that is being used for installation shall be adequately supported off the ground along the entire length to avoid damaging of the material during pullback due to ground surface conditions. Surface cuts or scratches greater than or equal to the maximum defect depth are not acceptable.

Pipe Size	Max. Defect Depth
In.	In.
4	1/16
6	1/11
8	5/32
10	3/16
12	1/4
> 12	Per Pipe Manufacturer's Recommendations

- F. The drilling fluid specialist shall remain on the project site during the entirety of the directional boring operation to ensure proper mixture and production of drilling fluids needed for the bore.
- G. Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent greater than the outside diameter of the pipe being installed.
- H. For bores with more than two radii of curvature (entrance and exit), the borehole should be reamed up to 50 percent larger than the outside diameter of the carrier pipe. Prereaming may be necessary dependent on size of material to be pulled.

- I. Additional passes for prereaming may be required for larger pipe. Incremental increases shall be used as needed until appropriate bore hole size has been achieved.
- J. Prereaming must be accomplished with no product attached to the reamer head on all bore pipe 6" and larger. The bore product maybe pulled back on final pass of prereaming upon prior approval from the Engineer.
- K. After reaming the borehole to the required diameter, the pipe shall be pulled through the hole. In front of the pipe shall be a breakaway swivel and barrel reamer to compact the borehole walls.
- L. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and drilling fluid system are designed to safely handle.
- M. Install all piping such that their location can be readily determined by electronic designation after installation. For non-conductive installations, externally attach two (2) tracer wires; see Section 2.01 – Materials, Part I. above, to the product pipe. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors must extend 2 feet beyond bore termini. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last 6 inches of the sheath. No deductions are allowed for failed tracking conductors. Upon completion of the directional bore, the Contractor shall demonstrate to the County that the wire is continuous and unbroken through the entire run of the pipe by providing full signal conductivity (including splices) when energizing for the entire run in the presence of the County Representative. If the wire is broken, the Contractor shall repair or replace it at no additional cost to the County.

END OF SECTION 02 26 19

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor and equipment and construct manholes consisting of fiberglass as shown on the Drawings and as specified herein.
- B. Fiberglass reinforced polyester manholes shall be manufactured from commercial grade polyester or vinyl ester resin with fiberglass reinforcements. Manholes shall be a one piece unit manufactured to meet or exceed all specifications of A.S.T.M. D-3753, latest addition. Manholes shall be manufactured by an established national manufacturer exclusively producing FRP sanitary sewer manholes.
- C. The manufacture, dimensions, material and construction methods shall be available for inspection and approved by the Engineer in advance of construction. The Engineer reserves the right to inspect the facilities of the supplier and the manufacturer if they are different.
- D. Intercept manholes shall be either free standing fiberglass or precast concrete with one piece fiberglass liner. Intercept manholes are defined as manholes with a force main discharging into them followed by gravity manholes to the lift station. They are further defined as other than straight through flow, such as tees or drop inlet. Manholes where turbulence and release of hydrogen sulfide gas is anticipated are also considered intercept manholes.

1.2 SUBMITTALS

The Contractor shall submit shop drawings showing details of construction, reinforcing, joints, openings and all other specified details, including traffic wheel load rating, to the Owner/Engineer for review and approval.

1.3 INSPECTION

- A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Owner/Engineer or authorized representative of the Owner. Such inspection may be made at the place of manufacture, on site, or both locations. The fiberglass section may be inspected prior to unloading from the delivery truck and marked by the inspector showing acceptance or rejection. However, discovery of failure at any time to meet the requirements of these Specifications is cause for rejection.
- B. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which are damaged after delivery as determined by the Engineer, shall be rejected. Sections already installed, shall be removed and replaced entirely at the Contractor's expense.
- C. At the time of inspection, the sections shall be examined for compliance with ASTM D-3753, latest revision, these Specifications and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, blisters, cracks, roughness, soundness, etc. The surface shall be free of defect.
- D. Imperfections may be repaired subject to the approval of the Engineer and after demonstration by the manufacturer that strong and permanent repairs result.

PART 2 - PRODUCTS

2.1 FIBERGLASS MATERIALS

- A. Resin: The resins used shall be a commercial grade unsaturated polyester resin.
- B. Reinforcing Materials: The reinforcing materials shall be commercial Grade "E" type glass in the form of continuous roving and chop roving, and shall have a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.
- C. Interior Surfacing Material: The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020" thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5" (13 mm) to maximum length of 2.0" (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz/ft<sup>2</sup>. Each pass of chopped roving shall be well-rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10" (2.5 mm).
- D. Interior Surface: The surface shall be free of crazing, delamination, blisters larger than 0.5" in diameter and wrinkles of 0.125" or greater in depth. Surface pits may be permitted if they are less than 0.75" in diameter and less than 0.0625" deep. Voids that may not be broken with finger pressure and that are entirely below the resin surface shall be permitted if they are less than 0.5" in diameter and less than 0.0625" thick.
- E. Wall Construction Procedure: After inner layer has been applied, the manhole wall shall be constructed with chop and continuous strand filament wound manufacturing process which insures continuous reinforcement and uniform strength and composition. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one piece unit. Seams shall be fibreglassed on the inside and the outside using the same glass-resin jointing procedure.
- F. Exterior Surface: There shall be a UV inhibitor consisting of gray pigment added to the exterior resin coat for a minimum thickness .125" to prevent degradation during aboveground storage.
- G. Repairs: All manhole repairs shall meet all requirements of the Contract Documents.
- H. Manhole Lengths: Manhole lengths shall be measured in 6" increments +/- 2".
- I. Diameter Tolerance: Tolerance of inside diameter shall be +/- 1% of required manhole diameter.
- J. Load Rating: The complete manhole shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with A.S.T.M. D-3753. To establish this rating, the complete manhole shall not leak, crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 in. at the point of load application when loaded to 24,000 lb. This testing criteria shall not relieve the manufacturer of the responsibility for providing manholes that may sustain, without damage, all legal Florida wheel loads.

- K. Stiffness: The manhole cylinder shall have the minimum pipe-stiffness values shown in table below when tested in accordance with A.S.T.M. D-3753 Table 1.

MANHOLE LENGTH IN FT.	F/ $\Delta$ Y, PSI (k Pa)
3 - 6.5	0.72 ( 4.96)
7 - 12.5	1.26 ( 8.69)
13 - 20.5	2.01 (13.86)
21 - 25.5	3.02 (20.82)
26 - 35	5.24 (36.13)

- L. Soundness: The Contractor shall insure that in order to determine soundness, the manufacturer shall apply an air or water pressure test to the manhole test sample. Test pressure shall be not less than 3 psig or greater than 5 psig. The manufacturer shall inspect the entire manhole for leaks while holding at the established pressure. Leakage through the laminate shall be cause for failure of the test. Refer to A.S.T.M. D-3753 8.6.
- M. Chemical Resistance: Test in accordance with A.S.T.M. D-3753 8.7.
- N. Manhole Bottom: Manholes may require resin fiber-reinforced bottoms. Bottom shall have a minimum of three 1-1/2" deep x 3-1/2" wide stiffening ribs completely enclosed with resin fiber-reinforcement and have a minimum 3" anti-flotation ring. Manhole bottom shall be a minimum of 5/16" thick and designed to resist all pressures induced by water, soil and wheel loads with a maximum deflection of 1/4".
- O. Fillers and Additives: Fillers shall be inert to the environment and manhole construction. Sand shall not be an approved filler. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of the Contract Documents. The resulting reinforced-plastic material shall meet the requirements of the Contract Documents.

## 2.2 MANHOLE FRAMES AND LIDS

Manhole frames and lids shall meet ASTM A48, Specification for Gray Iron Castings, Class 30 or Grade 60-45-12 Ductile Iron meeting the requirements of ASTM A536, Specification of Ductile Iron Casting. Cast in a true symmetrical pattern of tough, dense and even grained iron, free from warping, scales, lumps, blisters, sandholes or any defects of any kind. Provide indented pattern lids with lettering as shown on the Drawings. Machine or grind frames and lids at touching surfaces to provide firm seats and prevent rocking. Remove and replace any set not matching perfectly. All frames and covers shall be designed to withstand an HS20 wheel loading as defined by AASHTO specifications.

## 2.3 MANHOLE INSERTS

All sanitary sewer manholes installed shall require watertight manhole inserts. Inserts shall be as manufactured by FRW Industries, Conroe, Texas or approved equal. Inserts shall be complete with a self-cleaning relief valve. Relief valve shall operate on a pressure differential of 1/2 psi. Neoprene gaskets shall be installed under the insert lip to insure a leakproof seal.

PART 3 - MANUFACTURE

3.1 MANUFACTURE OF FIBERGLASS MANHOLES

- A. Manhole cylinders, manway reducers, and connectors shall be manufactured from glass fiber-reinforced polyester or using a combination of chop and continuous filament wound process.
- B. Interior Access: All installed manholes shall be designed so that they support a ladder or step system. All ladder or step systems shall be installed in accordance with the manufacturer's recommendations.
- C. Manway Reducer: For 48" diameter manholes, manway reducers shall be concentric with respect to the larger portion of the manhole diameter. Larger manholes may have concentric or eccentric manway reducer openings.
- D. Cover and Ring Support: A typical ring and cover plate shall be supported without damage to the manhole. Normal installation shall include 6" to 18" of concrete grade rings between fiberglass manhole and cover plate ring.

3.2 EXTERIOR SURFACE

The exterior surface shall be relatively smooth with no sharp projections. Hand-work finish may be acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 0.5" in diameter, delamination or fiber show. For manholes intended to be anchored into concrete bases, there shall be an antiflotation anchor ring or rings provided around the bottom of the fiberglass wall.

3.3 PHYSICAL PROPERTIES

	Hoop Direction	Axial Direction
a. Tensile Strength (psi)	18,000	5,000
b. Tensile Modulus (psi)	$0.6 \times 10^6$	$0.7 \times 10^6$
c. Flexural Strength (psi)	26,000	4,500
d. Flexural Modulus (psi)	$1.4 \times 10^6$	$0.7 \times 10^6$
e. Compressive Strength (psi)	18,000	12,000

3.4 TEST METHODS

All tests shall be performed as specified in A.S.T.M. D-3753 latest addition, Section 8. Test method D-790 and test method D-695.

3.5 QUALITY CONTROL

Each manhole shall be tested and meet all required ASTM D-3753 designations for dimensional requirements, hardness, and workmanship. Test records shall be forwarded to the Owner/Engineer.

### 3.6 CERTIFICATION

As a basis of acceptance, the manufacturer shall provide an independent certification consisting of a copy of the manufacturer's test reports along with a copy of the test results certifying that representative manhole samples have been tested, and inspected in accordance with the provisions of this Specification and meet all requirements of same.

### 3.7 SHIPPING AND HANDLING

The Contractor shall not drop or impact the fiberglass manhole. An approved method of lifting the fiberglass manhole is by inserting a 4"x4"x30" timber into the top of manhole with cable attached or by a nylon sling or "choker" connection around center of manhole. Use of chains or cables in contact with the manhole surface is prohibited. The Contractor is advised that whatever method he chooses to install the manhole, it is his responsibility to handle and install it in a manner so as not to cause damage.

## PART 4 - CONCRETE

- A. Fiberglass Bottom: The Contractor may use concrete to form the bench area and invert. Concrete also may be used on the top of anti-flotation ring and around the reducer section as required to resist buoyancy.
- B. Concrete Bottom: The Contractor shall lower the manhole into the wet concrete until it reaches the proper elevation. A minimum of 6" of fiberglass manhole shall be inserted into the wet concrete below flow line prior to making the manhole plumb. The concrete shall extend a minimum of one foot from the outside wall of the manhole and a minimum of 6" above influent lines. Concrete shall form the bench and invert area and rise a minimum of 4" above influent lines. Concrete may be required by the Owner/Engineer around the reducer section to resist buoyancy as well as other forces due to water and soil pressures. Concrete bases shall be at least 16" thick and properly reinforced to resist pull out of the fiberglass manhole.
- C. Concrete Collar: Design of the concrete collars required to distribute traffic wheel loadings shall be included in the design of manholes. The design shall be signed and sealed by a Florida licensed Professional Engineer. This design shall also include any requirements for the support of the manhole lid and frame.

## PART 5 - MANHOLE CONSTRUCTION

### A. FIBERGLASS MANHOLE INSTALLATION

The Contractor shall set fiberglass section vertical and in true alignment. All manholes shall meet the following installation tolerances:

The finished manhole shall not be out of plumb by more than 3/8" per 10 feet of height. For manholes exceeding 40'-0" high, the variation from plumb shall not exceed 1-1/2". Any jog or offset of wall surface each side of a joint shall not exceed 1/2". Variation in the joint width around the circumference of the manhole shall not exceed 3/8".

- B. GRADE ADJUSTMENT: The Contractor shall set precast concrete grade rings on top of manhole slabs and precast concrete manhole cones to provide grade adjustment in setting manhole frames.

- C. **BACKFILL:** Unless otherwise shown on the Drawings, sand, crushed stone, or pea gravel shall be used for backfill around the manhole for a minimum distance of one foot from the outside surface and extending from the bottom of the excavation to the top of the reducer section. Suitable material chosen from the excavation may be used for the remainder of the backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by Engineer.
- D. **BACKFILL PROCEDURE:** The Contractor shall place backfill in maximum layers of 12 inches loose measure and mechanically tamp to 95% Standard Proctor Density, unless otherwise approved by Engineer. Flooding shall not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the fiberglass manhole structure.
- E. **MARKING AND IDENTIFICATION:** Each manhole shall be marked on the inside and outside with the following information:
  - 1. Manufacturer's name or trademark.
  - 2. Manufacturer's factory location.
  - 3. Manufacturer's serial number.
  - 4. Total length.

F. **TESTING**

- 1. After each manhole is constructed to grade and prior to being backfilling, each manhole shall be tested for water tightness.
  - a. Plug pipe lines and perform vacuum test. Observing all recommended safety measures, induce a backpressure of 5.0 psi equivalent to 10" Hg (mercury). The manhole assembly is considered satisfactory if the vacuum loss is less than 1" Hg for the length of time listed in the following table:

Dept Feet	Time of Test in Seconds		
	Manhole Diameter Feet		
	4	5	6
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
T	5	6.5	8

Note: Add "T" seconds for each additional 2'-0" of depth.

- 2. Failure to pass one of these tests requires the contractor to correct the problems and retest. The Contractor shall replace leaking gaskets and/or concrete sections and retest the completed manhole. No manhole will be accepted without successfully passing this test.

- G. STUB LINES: The Contractor shall provide stub lines where shown on the Drawings or as directed by the Engineer for the connection of future sewer lines to manholes. Provide bell end enclosed with an approved plug at the end of each stub line. Bell of stub line shall be as close to manhole exterior surface as practical. The Contractor shall accurately reference each stub line for direction and record along with the actual invert elevation. He shall furnish the Engineer two copies of the above specified data on stub lines.
  
- H. CONNECTION TO EXISTING MANHOLES: All piping entering existing manholes shall have resilient pipe to manhole seals per ASTM C-923.

END OF SECTION 02 26 25



PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. All valves and appurtenances shall be of the size shown on the Drawings and, to the extent possible, all equipment of the same type on the Project shall be from one manufacturer.
- C. All valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- D. All valves shall have a factory applied, fusion bonded epoxy coating on interior and exterior unless noted otherwise in the plans or this specification.
- E. The equipment shall include, but not be limited to, the following:
  - 1. Gate valves (Sec. 2.01)
  - 2. Pressure Sustaining and Check Valves (Sec. 2.02)
  - 3. Ball Valves for PVC Pipe (Sec. 2.03)
  - 4. Butterfly Valves (Sec. 2.04)
  - 5. Plug Valves (Sec. 2.05)
  - 6. Valve Actuators (Sec. 2.06)
  - 7. Air Release Valves (Sec. 2.07)
  - 8. Valves Boxes (Sec. 2.08)
  - 9. Corporation Cocks (Sec. 2.09)
  - 10. Flange Adapter Couplings (Sec. 2.10)
  - 11. Flexible Couplings (Sec. 2.11)
  - 12. Hose Bibs (Sec. 2.12)
  - 13. Slow Closing Air and Vacuum Valves (Sec. 2.13)
  - 14. Surge Anticipator Valve (Sec. 2.14)
  - 15. Check Valves (Sec. 2.15)
  - 16. Hydrants (Sec. 2.16)
  - 17. Restraining Clamps (Sec. 2.17)
  - 18. Tapping Sleeves and Tapping Valves (Sec. 2.18)
  - 19. Single Acting Altitude Valves (Sec. 2.19)

1.2 DESCRIPTION OF SYSTEMS

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaim water, wastewater, etc., depending on the applications.

1.3 QUALIFICATIONS

All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable. Valves shall be as covered under mechanical devices in Section 8 of ANSI/NSF Standard 61.

1.4 SUBMITTALS

- A. Submit to the Engineer within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer for approval in accordance with the Specifications.

1.5 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. All buried valves shall have cast or ductile iron three (3) piece valve bodies.
- B. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.
- C. Where required, gate valves shall be provided with a box cast in a concrete slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Orange, Massachusetts, Clow, DeZurik or approved equal.
- D. Gate valves with 3"-20" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or C515 and UL/FM of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- E. Wrench nut shall be provided for operating the valve.
- F. Valves shall be suitable for an operating pressure of 200 psi and shall be tested in accordance with AWWA C509 or C515. Mueller, Kennedy, M&H, and Clow are acceptable valves.
- G. All bonnet bolts, nuts and studs shall be stainless steel.

2.2 PRESSURE SUSTAINING AND CHECK VALVE

- A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. The stainless steel stem shall be fully guided at both ends by a bearing in the valve cover, and an integral bearing in the valve seat. It shall be sleeved at both ends with delrin. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation cocks to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with seat cut to 5 degrees taper.
- B. Valve shall maintain a minimum (adjustable) upstream pressure to a preset (adjustable) maximum. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.
- C. Valve shall be cast iron (ASTM A48) with main valve trim of brass (QQB-B-626) and bronze (ASTM B61). The pilot control valves shall be cast brass (ASTM B62) with 303 stainless steel trim. All ferrous surfaces inside and outside shall have a 2-part epoxy coating. Valve shall be similar in all respects to CLA-VAL Company, Model 692G-01ABKG, as manufactured by CLA-VAL Company, Winter Park, Florida, or similar pressure sustaining and check valve as manufactured by Golden Alderson; or approved equal.

2.3 BALL VALVES FOR PVC PIPE

- A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Wallace and Tiernan, Inc., Plastiline, Inc., or approved equal.
- B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

2.4 BUTTERFLY VALVES

- A. Butterfly valves shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B, except that valves furnished downstream of the high service pumps shall be Class 250 and equal to those manufactured by Henry Pratt Company, DeZurik, Mueller, or approved equal. M&H/Kennedy/Clow are not generally approved equals. Ductile iron conforming to ASTM A536, Grade 65-45-12 shall be provided for all Class 250 valves. All valves shall be leak tested at 200 psi.
- B. The face-to-face dimensions of flanged end valves shall be in accordance with Table 1 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1.

- C. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock screws and be capable of the 1/8-inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where the EPDM seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or Nickel-Chrome, 80-20%. Where the EPDM seat is mounted on the valve disc, the valve body shall be fitted with an 18-8 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.
- D. The valve body shall be constructed of ductile iron or close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Butterfly valves of the "wafer" or "spool" type will not be accepted.
- E. The valve shaft shall be turned, ground, and polished constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.
- F. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve for a period of five minutes. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 230 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. The Class 150 valves shall be tested in conformance with AWWA C-504.
- G. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable, and as herein specified.
- H. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.
- I. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.
- J. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.
- K. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

## 2.5 PLUG VALVES

- A. All plug valves shall be eccentric plug valves capable of sustaining 150 psi in either direction without leaking.

Exception: Single direction plug valves may be used if it is clearly demonstrated they will never be required to resist pressure in both directions either in service or during pipe line testing.

- B. Plug valves shall be tested in accordance with current AWWA Standard C-504-80 Section 5. Each valve shall be performance tested in accordance with paragraph 5.2 and shall be given a leakage test and hydrostatic test as described in paragraphs 5.3 and 5.4. Plug valves shall be Kennedy or Dezurik.
- C. Plug valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the Plans. Flanged valves shall be faced and drilled to the ANSI 150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-72. Bell ends shall be to the AWWA Standard C100-55 Class B. Screwed ends shall be to the NPT standard.
- D. Plug valve bodies shall be of ASTM A126 Class B Semi-steel, 31,000 psi tensile strength minimum in compliance with AWWA Standard C507-73, Section 5.1 and AWWA Standard C504-70 Section 6.4. Port areas for valves 20-inches and smaller shall be 80 percent of full pipe area. Valves 24 inch and larger shall have a minimum port area between 80 and 100 percent of full nominal pipe area. All exposed nuts, bolts, springs, washers, etc. shall be zinc or cadmium plated. Resilient plug facings shall be of Hycar or Neoprene.
- E. Plug valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. These bearings shall comply with current AWWA Standards.

## 2.6 VALVE ACTUATORS

- A. General
  - 1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor operated.
  - 2. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.
  - 3. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designated C504, insofar as applicable and as herein specified.
- B. Manual Actuators
  - 1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Actuator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage.

Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

C. Motor Actuators (Modulating)

1. The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbled teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.
4. The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically.

Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
7. All units shall have strip heaters in both the motor and limit switch compartments.
8. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.
9. The electronics for the electric operator shall be protected against temporary submergence.
10. Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.
  - (a) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
  - (b) The motor shall be prelubricated and all bearings shall be of the anti-friction type.
3. The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.
4. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.

5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
6. Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.
7. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
8. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.
9. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

## 2.7 AIR RELEASE VALVES

The air release valves for use in water or force mains shall be installed as shown on the Drawings. The valves shall have a cast iron body cover and baffle, stainless steel float, bronze water diffuser, Buna-N or Viton seat, and stainless steel trim. The fittings shall be threaded. The air release valves shall be Model 200A or 400A as manufactured by APCO Valve and Primer Corporation, Schaumburg, Illinois; or approved equal.

## 2.8 VALVE BOXES

- A. Buried valves shall have cast-iron three piece valve boxes or HDPE adjustable valve boxes. Cast iron valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be two-piece, screw type, having a 5-1/4 inch shaft. The upper section shall have a flange at the bottom with sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have WATER, SEWER, or RECLAIM, as applicable, cast into the top.
- B. All valves shall have actuating nuts extended to within four (4) feet of the top of the valve box. All valve extensions will have a centering guide plate two (2) inches maximum below the actuating nut. The valve extension shall be fastened to the existing nut with a set screw. Valve boxes shall be provided with a concrete base and a valve nameplate engraved with lettering 1/8-inch deep as shown on the Drawings.
- C. HDPE adjustable valve boxes shall be one complete assembled unit composed of the valve box and extension stem. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodate variable trench depths.

- D. The entire assembly shall be made of heavy wall high density polyethylene. All exterior components shall be joined with stainless steel screws. The valve box top section shall be adaptable to fit inside a valve box upper section.
- E. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The stem material shall be of plated steel square tubing. The stem assembly shall have a built-in device that keeps the stem assembly from disengaging at its fully extended length. The extension stem must be torque tested to 1000 foot pounds. Covers shall have WATER, SEWER or RECLAIMED clearly and permanently impressed into the top surface.

## 2.9 CORPORATION COCKS

Corporation cocks for connections to cast-iron, ductile iron or steel piping shall be all brass or bronze suitable for 180 psi operating pressure and similar to Mueller Co. H-10046 or approved equal by Clow Corp., and shall be of sizes required and/or noted on the Drawings.

## 2.10 FLANGE ADAPTER COUPLINGS

Flange adapter couplings shall be of the size and pressure rating required for each installation and shall be suitable for use on either cast iron or ductile iron pipe. They shall be similar or approved equal to Dresser Company, Style 128. All couplings shall have a sufficient number of factory installed anchor studs to meet or exceed a minimum test pressure rating of 230 psi minimum.

## 2.11 FLEXIBLE COUPLINGS

Flexible couplings shall be either the split type or the sleeve type as shown on the Drawings.

1. Split type coupling shall be used with all interior piping and with exterior pipings noted on the Drawings. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contracting and expansion.
2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A 183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.
3. Victaulic type couplings and fittings may be used in lieu of flanged joints. Pipes shall be radius grooved as specified for use with the Victaulic couplings. Flanged adapter connections at fittings, valves, and equipment shall be Victaulic Vic Flange Style 741, equal by Gustin-Bacon Group, Division of Certain-Teed Products, Kansas City, Kansas, or approved equal.
4. Sleeve type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38 or 40, as shown on the Drawings, or equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
5. All couplings shall be furnished with the pipe stop removed.
6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
7. If the Contractor decides to use victaulic couplings in lieu of flanged joints, he shall be responsible for supplying supports for the joints.

2.12 HOSE BIBS

Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.13 SLOW CLOSING AIR AND VACUUM VALVES

- A. The Contractor shall furnish and install slow closing air and vacuum valves as shown on the Drawings which shall have two (2) independent valves bolted together. The air and vacuum valve shall have all stainless steel float, guided on both ends with stainless shafts. The air and vacuum valve seat shall be Buna-N to insure drop tight closure. The Buna-N seat shall be fastened to the cover stainless shoulder screws in a manner to prevent distortion of the seat. The float shall be guided at both ends with stainless steel bushings.
- B. The valve cover shall have a male lip designed to fit into the body register for accurate alignment of the float into the Buna-N seat. The valve cover shall have 250-pound class flanged outlet connection.
- C. The surge check valve shall be bolted to the inlet of the air and vacuum valve and consist of a body, seat, disc, and compression spring. A surge check unit shall operate on the interphase between the kinetic energy and relative velocity flows of air and water, so that after air passes through, and water rushes into the surge check, the disc starts to close, reducing the rate of flow of water into the air valve by means of throttling orifices in the disc to prevent water hammer in the air valves. The surge check orifices must be adjustable type for regulation in the field to suit operating conditions. Valve shall be rated for 250-pound class working pressure.
- D. The complete slow closing air and vacuum valve with air release valve shall have been flow tested in the field, substantiated with test data to show reduction of surge pressure in the valve. Flow test data shall be submitted with initial shop drawings for approval.
- E. Valve exterior to be painted Red Oxide, Phenolic TT-P86, Primer or approved equal for high resistance to corrosion.
- F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Air Valve Cover, Body, and Surge Check Body	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Surge Check Seat and Disc	Stainless Steel	ASTM A582
Air Valve Seat	Buna-N	
Spring	Stainless Steel	T302

2.14 SURGE ANTICIPATOR VALVES

- A. Surge anticipator valves shall be furnished for the pumping systems as shown on the Drawings. The valve shall be hydraulically operated, pilot controlled, and diaphragm or piston actuated. The main valve shall be cast iron conforming to ASTM A48 with bronze trim conforming to ASTM B61 and flanged ends conforming to ANSI B161.1. The main valve shall be globe type with a single removable seat and a resilient disc.
- B. The diaphragm actuated valve shall have a stainless steel stem guided at both ends by a bearing in the valve cover and an integral bearing surface in the seat. No external packing glands shall be permitted. The valve shall be fully serviceable without removing it from the line. The pilot system shall be of noncorrosive construction and provided with isolation cocks.
- C. The piston actuated valve shall operate on the differential piston principle. The valve piston shall be guided on its outside diameter. The valve shall be able to operate in any position and shall be fully serviceable without removing it from the line. The pilot system shall be provided with isolation cocks, and be of noncorrosive materials of construction.
- D. The valve shall be designed specifically to minimize the effects of water hammer, resulting from power failure at the pumping station, or from normal stopping and starting of pumping operators. The valve shall open hydraulically on a down surge, or low pressure wave created when the pump stops, remain open during the low pressure cycle in order to be open when the high pressure wave returns. The high pressure pilot shall be adjustable over a 20 to 200 psi range and the low pressure pilot shall be adjustable over a 15 to 75 psi range. The valve shall be the 250 Class.

2.15 CHECK VALVES

- A. Check valves for cast iron and ductile iron pipe lines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall be iron body, bronze mounted, single disc, 175 psi working water pressure and nonshock. Valves shall be as manufactured by Mueller, Clow, Kennedy, or M&H. Valves 8" and larger shall be air cushioned to reduce valve slam.
- B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- C. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers. The interior and exterior of the valve body shall have a factory applied fusion bonded or 10 mil 2 part epoxy coating (Protecto 401 or approved equal).
- D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Weights provided and approved by the Engineer shall be installed.

2.16 HYDRANTS

Hydrants shall be AVK Series 27 DRX Barrel (nostalgic style with stainless steel bolts) Kennedy Type K-81, American Darling B-84-B or Mueller Super Centurian A423, or approved equal and shall conform to the "Standard Specification for Fire Hydrants for Ordinary Water Works Service", AWWA C502, and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern and of standard size, and shall have one 4-1/2" steamer nozzle and two 2-1/2" hose nozzles.
2. Hydrant inlet connections shall have mechanical joints for 6" ductile-iron pipe.
3. Hydrant valve opening shall have an area at least equal to that area of a 5-1/4" minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two 2-1/2" hose nozzles when opened together with a loss of not more than 2 psi in the hydrants.
4. Each hydrant shall be designed for installation in a trench that will provide 5-ft. cover.
5. Hydrants shall be hydrostatically tested as specified in AWWA C502.
6. Hydrants shall be rated at 200 psi.
7. All nozzle threads shall be American National Standard.
8. Each nozzle cap shall be provided with a Buna N rubber washer.
9. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism and without the mechanism obstructing the discharge from any outlet.
10. Hydrants must be capable of being extended without removing any operating parts.
11. Hydrants shall have bronze-to-bronze seatings as per AWWA C502-85.
12. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The resilient seat material shall meet the requirements of AWWA C-509 and shall preferably be EPDM Elastomer.
13. Internal and below ground iron parts (bonnet, nozzle section and base) shall have a fusion bonded epoxy coating per AWWA C550. Aboveground external hydrant parts (cap, bonnet and nozzle section) shall be either epoxy coated together with a UV resistant polyester coating or have two shop coats of paint per AWWA C502. The lower stand pipe or barrel shall be protected with asphaltic coatings per AWWA C502.
14. Exterior nuts, bolts and washer shall be stainless steel. Bronze nuts may be used below grade.
15. All internal operating parts shall be removable without requiring excavation.

2.17 RESTRAINING CLAMPS

Restraining clamp assemblies as detailed in the drawings for use at hydrant connections to water mains, or at fittings where shown on the Drawings, shall be as manufactured by American Cast Iron Pipe, Star Pipe Products, U.S. Pipe; or approved equal.

2.18 TAPPING SLEEVES AND GATE VALVES

- A. Tapping valves shall meet the requirement of AWWA C500. The valves shall be flanged, shall be mechanical joint outlet with nonrising stem, designed for vertical burial and shall open left or counterclockwise. Stuffing boxes shall be the "O-ring" type. Operating nut shall be AWWA Standard 2" square for valves 2" and up. The valves shall be provided with an overload seat to permit the use of full size cutters. Gaskets shall cover the entire area of flange surfaces and shall be supplied with EPDM wedges up to 30" diameter.

- B. Tapping sleeves and saddles shall seal to the pipe by the use of a confined "O" ring gasket, and shall be able to withstand a pressure test of 180 psi for one hour with no leakage in accordance with AWWA C110, latest edition. A stainless steel 3/4" NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be protected from corrosion by being fusion applied epoxy coated, or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

## 2.19 SINGLE ACTING ALTITUDE VALVES

### A. Function

1. The altitude control valve shall be of the single acting type, closing off tightly when the water reaches the maximum predetermined level in the tank to prevent overflow; and opening to permit replenishing of the tank supply when the water level drops approximately 6" to 12" below the maximum level.
2. A hand operated valve in the power water line to the top of the piston shall permit adjustment of the speed of valve closing. The tank water level control shall be by means of a diaphragm operated, spring loaded, three way pilot which directs power water to or from the top of the main valve piston. The three way pilot shall be of bronze construction. The diaphragm surface exposed to the tank head shall be not less than 57 sq. inches. It shall be possible to adjust the spring above the diaphragm for water level control approximately 20% above or below the factory setting.

### B. Description

1. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area on the upper surface of the piston is of a greater area than the underside of the piston.
2. The valve piston shall be guided on its outside diameter by long stroke stationary Vee ports which shall be downstream of the seating surface to minimize the consequences of throttling. Throttling shall be done by the valve Vee ports and not the valve seating surfaces.
3. The valve shall be capable of operating in any position and shall incorporate only one flanged cover at the valve top from which all internal parts shall be accessible. There shall be no stems, stem guides, or spokes within the waterway. There shall be no springs to assist the valve operation.

### C. Construction

1. The valve body shall be of cast iron ASTM A-126 with flanges conforming to the latest ANSI Standards. The valve shall be extra heavy construction throughout. The valve interior trim shall be bronze B-62 as well as the main valve operation.
2. The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
3. All controls and piping shall be of non-corrosive construction.
4. A visual valve position indicator shall be provided for observing the valve piston position at any time.

### D. Figure Number

The valves shall be the 20" Globe type (Fig. 3200-D) as manufactured by GA Industries of Mars, Pennsylvania, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the Engineer.
- B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.
- E. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.
- F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.
- H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.2 HYDRANTS

- A. Hydrants shall be set at the locations designated by the Engineer and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.
- B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.
- C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.
- D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.
- E. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.
- F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.3 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.4 FIELD PAINTING

All metal valves and appurtenances specified herein and exposed to view shall be painted.

3.5 INSPECTION AND TESTING

Completed pipe shall be subjected to hydrostatic pressure test for two hours at 180 psi. All leaks shall be repaired and lines retested as approved by the Engineer. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION 02 26 40

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section includes items and operations which are not specified in detail as separate items, but may be sufficiently described as to the kind and extent of work involved. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to complete all work under this Section.
- B. The work of this Section may include, but is not limited to the following:
  - 1. Restoration of roads, sidewalks, driveways, curbing and gutters, fences, guardrails, lawns, shrubbery and any other existing items damaged or destroyed.
  - 2. Crossing utilities.
  - 3. Relocation of existing water, reclaim water, or sewer lines less than four inches diameter, water and sanitary sewer services, low pressure gas lines, telephone lines, electric lines, cable TV lines as shown on the Contract Drawings.
  - 4. Restoring easements (servitudes) and rights-of-way.
  - 5. Clean up.
  - 6. Incidental work (project photographs, testing, shop drawings, traffic control, record drawings, etc.).
  - 7. Excavation and Embankment - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1991 Edition or latest revision).
  - 8. Stormwater and erosion control devices.

1.2 SUBMITTAL OF LUMP SUM BREAKDOWN

Contractor shall submit to the Owner/Engineer, a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Proposal within 10 days after date of Notice to Proceed.

1.3 WORK SPECIFIED UNDER OTHER SECTIONS

All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

Materials required for this Section shall equal or exceed materials that are to be restored. The Contractor may remove and replace or reuse existing materials with the exception of paving.

PART 3 - EXECUTION

3.1 RESTORING OF SIDEWALKS, ROADS, CURBING, FENCES AND GUARDRAILS

- A. The Contractor shall protect existing sidewalks & curbing. If necessary, sidewalks & curbing shall be removed from joint to joint and replaced after backfilling. Curbing damaged during construction because of the Contractor's negligence or convenience, shall be replaced with sidewalks & curbing of equal quality and dimension at no cost to the Owner.

- B. At the locations necessary for the Contractor to remove, store and replace existing fences and guardrails during construction, the sections removed shall be only at the direction of the Engineer. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced at no cost to the Owner with fencing equal to or better than that damaged and the work shall be satisfactory to the Engineer.
- C. Guardrails in the vicinity of the work shall be protected from damage by the Contractor. Damaged guardrails shall be replaced in a condition equal to those existing
- D. Road crossings shall be restored in accordance with the Contract Documents and current FDOT Standards. Compensation for road restoration shall be included under the Road Restoration Bid Item if specified or under Miscellaneous Cleanup if it is not specified.

### 3.2 CROSSING UTILITIES

This item shall include any extra work required in crossing culverts, water courses, drains, water mains and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required or implied for the proposed crossing, whether or not shown on the Drawings.

### 3.3 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES AND CABLE TV LINES

The Contractor shall notify the proper utility involved when relocation of these utility lines is required. The Contractor shall coordinate all relocation work by the utility so that construction shall not be hindered.

### 3.4 RESTORING THE EASEMENTS AND RIGHTS-OF-WAY

The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury all walls, fences, cultivated shrubbery, pavement, underground facilities, including water, sewer and reclaimed water lines and services, or other utilities which may be encountered along the easement. If removal and replacement is required, it shall be done in a workmanlike manner, at his expense, so that the replacement are equivalent to that which existed prior to construction.

### 3.5 STORMWATER AND EROSION CONTROL DEVICES

The Contractor shall be responsible for, provide, and install all stormwater and erosion control devices necessary to insure satisfactory compliance with the Florida Department of Environmental Protection Stormwater, Erosion, and Sedimentation Control Inspector's Manual.

END OF SECTION 02 29 99

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SECTION 02 41 13  
SELECTIVE DEMOLITION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Selective demolition work requires the selective removal and subsequent offsite disposal of the following kinds of elements:
  - 1. All items as indicated and noted on the Drawings.
  - 2. The Owner has the last right of refusal on all demolished and removed items.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Submit schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
  - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
- C. Submit 24 minimum digital photographs in JPEG format of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Architect prior to start of work.

### 1.3 QUALITY ASSURANCE

- A. Pre-Selective Demolition Conference: Conduct conference at Project site to comply with requirements of the Project Manual specifications. Review methods and procedures related to building demolition including, but not limited to, the following:
  - 1. Inspect and discuss conditions of construction to be demolished.
  - 2. Review structural load limitations of existing structures.
  - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review and finalize protection requirements.

### 1.4 PROJECT CONDITIONS

- D. Occupancy: Owner will not occupy the building areas during selective demolition.
- E. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

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- F. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed. The Owner has the last right of refusal on all items indicated as salvage or not.
  
- G. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
  - 1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
  - 2. Erect temporary covered passageways as required by authorities having jurisdiction.
  - 3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
  - 4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
  - 5. Protect floors with suitable coverings when necessary.
  - 6. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
  - 7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
  - 8. Remove protections at completion of work.
  
- H. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
  
- I. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
  - 1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
  
- J. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
  
- K. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
  - 1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
  - 2. Maintain fire protection services during selective demolition operations.

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- L. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
  - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- M. Explosives: Use of explosives will not be permitted.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
  - 1. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
  - 2. Erect and maintain dust-proof partitions, if directed by the Owner or Architect, and closures as required to prevent spread of dust or fumes to occupied portions of the building.
    - a. Provide weatherproof closures for exterior openings resulting from demolition work.
  - 2. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
    - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

### 3.2 DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
  - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
  - 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.

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3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
  4. Demolish foundation walls to a depth of not less than 12 inches below existing ground surface.
  5. Demolish and remove below-grade wood or metal construction.
  6. Break up below-grade concrete slabs.
  7. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
  8. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

## 3.3 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.
1. The Owner may wish to salvage items not indicated on Drawings as "Salvage - Deliver to Owner". Coordinate with Owner regarding all items to be "Salvaged and Delivered to Owner". The Owner has the last right of refusal on all items.

## 3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
1. If hazardous materials are encountered during demolition operations, comply with applicable Federal, State, and local regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution. Stop work immediately and notify Architect.
  2. Burning of removed materials is not permitted on project site.
- B. Refer to Section 01 74 19, Construction Waste Management and Disposal, and comply with all requirements for demolished and removed building elements and selective demolition.

## 3.5 CLEANUP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.

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1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02 41 13

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**Division 03**  
Concrete



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SECTION 03 10 00  
CONCRETE FORMING & ACCESSORIES

## PART 1 - GENERAL

- 1.1 Related work described in other sections:
- A. Cast-in-place concrete.
  - B. Concrete Reinforcement.

## PART 2 - PRODUCTS

- 2.1 The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor.
- 2.2 The formwork shall be designed for the loads and lateral pressures outlined in Chapter 1, Design, of "Guide to Formwork for Concrete", (ACI 347) and wind loads as specified by the Florida Building Code. Design considerations and allowable stresses shall meet the requirements and the applications of the Florida Building Code.

## PART 3 - EXECUTION

- 3.1 Formwork shall be constructed so as to insure that the concrete will conform to tolerances of Section 3.3 of the referenced ACI standard. Where necessary to maintain the specified tolerances, the formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. The Contractor shall establish and maintain in an undisturbed condition control points and benchmarks to be used for reference purposes to check tolerances.
- 3.2 Construct forms to slopes, lines and dimensions shown, plumb and straight and sufficiently tight to prevent displacement and leakage of grout and to safely support construction loads. Do not coat forms with material that will stain or cause injury to exposed concrete surfaces. Keep wood forms wet as necessary to prevent shrinkage.
- 3.3 Positive means of adjustment (wedges or jacks) of shores and struts shall be provided and all settlement shall be taken up during concrete placing operations. They shall be securely braced against lateral deflections.
- 3.4 Temporary openings shall be provided at other points where necessary to facilitate cleaning and observation immediately before concrete is deposited.
- 3.5 Joints shall be tight fitting and braced solidly; vertical joints shall be truly plumb except as shown on plans and horizontal joints level and without changes in level in a horizontal line.
- 3.6 The surfaces of all concrete which will not be exposed to view shall be formed by the use of wood boards, concrete form grade, or plywood. All boards shall be free of shakes, loose knots, wavy edges and defects. Form lumber may be set horizontally or vertically as conditions require. Lumber and plywood once used in forms shall have loose nails withdrawn and surfaces in contact with concrete shall be thoroughly cleaned before reusing.
- 3.7 When forms are coated to prevent bond with concrete, it shall be done prior to placing of the reinforcing steel. Excess coating material shall not be allowed to stand in puddles in the forms nor allowed to come in contact with concrete against which fresh concrete will be placed.
- 3.8 Form accessories to be partially or wholly embedded in the concrete such as ties and hangers,

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shall be a commercially manufactured type. Wire is not acceptable. The portion remaining within the concrete shall leave no metal within one inch of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed one inch in diameter.

## 3.9 Removal of forms

- A. When repair of surface defects or finishing is required at an early age, forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.
- B. Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curling.
- C. Wood forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.
- D. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.
- E. Forms and shoring of the formwork used to support the weight of concrete in beams, slabs and other structural members shall remain in place as specified in ACI 347.

**END OF SECTION**

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SECTION 03 20 00  
CONCRETE REINFORCING

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

### 1.2 QUALITY ASSURANCE

- A. Perform concrete reinforcing work in accordance with ACI 318 unless specified otherwise in this Section.
- B. Submit two (2) certified copies of mill test report of supplied concrete reinforcing, indicating physical and chemical analysis.

### 1.3 REFERENCES

- A. ACI 318 - Building Code Requirements for Reinforced Concrete.
- B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- D. CRSI 63 - Recommended practice for placing reinforcing bars.
- E. CRSI 65 - Recommended practice for placing bar supports, specifications and nomenclature.
- F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

### 1.4 SUBMITTALS

- A. Shop Drawings
  - 1. Submit shop drawings in accordance with Contract Documents.
  - 2. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.
- B. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

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## PART 2 – PRODUCTS

### 2.1 REINFORCING

- A. Reinforcing steel: deformed billet steel bars, ASTM A615; plain finish.

<u>Grade</u>	<u>Minimum Yield Strength</u>
40	40,000 psi
60	60,000 psi

- B. Welded steel wire fabric: Deformed wire, ASTM A497; smooth wire ASTM A185 in flat sheets; plain finish.

### 2.2 ACCESSORY MATERIALS

- A. Tie wire: Minimum 16 gauge annealed type, or patented system accepted by Engineer.
- B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type: sized and shaped as required.

### 2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 315 and CRSI Manual of Standard Practice.
- B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by Engineer.
- C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.
- D. Allowable Tolerances:
1. Sheared length: +1 in.
  2. Depth of truss bars: +0, -1/2 in.
  3. Stirrups, ties and spirals:  $\pm 1/4$  in.
  4. All other bends:  $\pm 1$  in.

## PART 3 – EXECUTION

### 3.1 PLACEMENT

- A. Reinforcing shall be supported and secured against displacement. Do not deviate from true alignment.
- B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

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- C. Allowable Tolerances:
1. Concrete cover to form surfaces:  $\pm 1/4$  in.
  2. Minimum spacing between bars: 1 in.
  3. Top bars in slabs and beams:
    - Members 8 in. deep or less:  $\pm 1/4$  in.
    - Members more than 8 in.:  $\pm 1/2$  in.
  4. Crosswise of members: Spaced evenly within 2 in. of stated separation.
  5. Lengthwise of members: Plus or minus 2 in.
- D. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

**END OF SECTION**

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SECTION 03 30 00  
CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

- A. Poured-in-place concrete footings, columns, beams, and slabs.

### 1.2 QUALITY ASSURANCE

Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

### 1.3 TESTING LABORATORY SERVICES

- A. Inspection and testing will be performed by a testing laboratory in accordance with the Contract Documents.
- B. Provide free access to work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.
- D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.
- E. Three concrete test cylinders will be taken for every 100 cu. yds. or part thereof of each class of concrete placed each day.
- F. One slump test will be taken for each set of test cylinders taken.

### 1.4 REFERENCES

- A. ASTM C33 - Concrete Aggregates
- B. ASTM C150 - Portland Cement
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ASTM C260 - Air Entraining Admixtures for Concrete
- E. ASTM C94 - Ready-Mixed Concrete
- F. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- G. ACI 305 - Recommended Practice for Hot Weather Concreting

## PART 2 - PRODUCTS

### 2.1 CONCRETE MATERIALS

- A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.

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- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

## 2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A - water reducing admixture.

## 2.3 ACCEPTABLE MANUFACTURERS

- A. Acceptable Products:
  - 1. Pozzolith
  - 2. WRDA

## 2.4 ACCESSORIES

- A. Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

## 2.5 CONCRETE MIXES

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of following strength:
  - 1. Required concrete strengths as determined by 28 day cylinders shall be as shown on the Drawings, but shall not be less than 3000 psi.
  - 2. Select proportions for normal weight concrete in accordance with ACI 301 3.8 Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301 Table 3.4.1.
  - 3. All mixes shall be in accordance with FDOT Specifications.
- C. Use set-retarding admixtures during hot weather only when accepted by Engineer.
- D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

## 2.6 FORMS

- A. Forms shall be used for all concrete masonry, including footings. Form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.
- B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

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- C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms or plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.
- D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcement above the fresh concrete.
- E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.
- F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.
- H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.
- I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Through bolts or common wire shall not be used for form ties.

## PART 3 - EXECUTION

### 3.1 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.
- C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

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- G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- J. Conform to ACI 305 when concreting during hot weather.

## 3.2 SCREEDING

Screed floors level, maintaining surface flatness within a maximum deviation of 1/8" in 10 feet.

## 3.3 PATCHING

Allow Engineer to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed. All patching procedures shall be submitted to and approved by the Engineer prior to use.

## 3.4 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations.
- B. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of Engineer for each individual area.

## 3.5 CONCRETE FINISHING

Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

## 3.6 CURING AND PROTECTION

Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period of 7 days or until concrete strengths reaches 75% of the 28 day design strength.

Protection against moisture loss may be obtained with spray on curing compounds or plastic sheets. Protection against heat or cold may be obtained with insulated curing blankets or forms.

**END OF SECTION**

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SECTION 03 35 00  
CONCRETE FLOOR SEALERS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Furnish all necessary materials, labor and equipment required to provide and install the concrete floor sealer, as specified herein and as indicated on the Drawings.

### 1.2 SUBMITTAL

- A. **Product Data:** Submit manufacturer's specification or specific products of the concrete floor sealer, including physical properties and performance properties and all tests described herein and submit all Material Safety Data sheets. Each individual component of the system will be evaluated on the basis of these standards. For any of the tests not listed in the manufacturer's standard nationally published data, the manufacturer must supply the missing data from an independent test laboratory tested according to the referenced standard. Manufacturer's standard color chart shall also be submitted and must afford the Architect color selection from at least 12 standard colors.
- B. The concrete floor sealing specialist shall submit a 6" x 6" system sample for verification purposes and finish texture approval.
- C. **Contractor Experience:** The concrete floor sealing specialist shall furnish a list of three (3) projects using either specified material or another material pre-approved for this project that they have installed during the last five years. Information shall include: project name, square footage, contract name with owner's address and phone number. Also, the concrete floor sealer specialist shall furnish resumes detailing the experience of key project personnel including supervisors and technicians.
- D. Submit in accordance with Division 1 requirements.
- E. Submit warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. **Manufacturer's Qualifications:** Obtain concrete floor sealer materials from a single manufacturer.
- B. **Applicator's Qualifications:** Installation shall be performed by an concrete floor sealer specialist with skilled mechanics having not less than three (3) years of satisfactory experience in the application of the type and complexity of system as specified in this section. The concrete floor sealer specialist shall be approved in writing by the manufacturer of the concrete floor sealer as specified herein.

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- C. All products shall be V.O.C. compliant and shall meet the new EPA requirements effective September 13, 1999.
- D. All concrete surfaces scheduled to receive the concrete floor sealer shall be free from curing membranes or bond breakers and clear of any debris or construction latents directly prior to application of concrete floor sealer.

## 1.4 MATERIAL DELIVERY, HANDLING AND STORAGE

- A. Primary system materials shall be delivered in the manufacturer's undamaged, unopened containers. Each container shall be clearly marked with the following:
  - 1. Product Name.
  - 2. Manufacturer's Name.
  - 3. Component designation (A or B, etc.).
  - 4. Ratio of component mixture.
- B. Provide equipment and personnel to handle the materials by methods which prevent damage.
- C. The concrete floor sealer specialist shall promptly inspect all direct jobsite deliveries to assure that quantities are correct and that materials comply with requirements and are not damaged.
- D. The concrete floor sealer specialist shall be responsible for all materials furnished by him, and he shall replace, at his own expense, all such material that is found to be defective in manufacturing or that has become damaged in transit, handling or storage.
- E. Store materials in strict accordance with manufacturer's instructions, with seals and labels intact and legible.
- F. Proper concrete protection from staining must be observed. Steel must not be placed on slab to avoid staining. Diaper hydraulic powered equipment to avoid oil and gasoline staining. Pipe cutting machines shall not be used on the concrete slabs where the clear sealers are scheduled. Any rubber tired traffic shall be kept at a minimum and shall be protected with drop cloths.

## 1.5 JOB CONDITIONS

- A. The concrete floor sealer specialist shall visit the jobsite prior to beginning the application of the concrete floor sealer to evaluate substrate condition, including concrete moisture content, and the extent of repairs required, if any. Concrete floors shall be tested to verify that the moisture content of the substrate does not exceed that as recommended by the manufacturer.

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- B. The concrete floor sealer specialist should exercise care during surface preparation and system application to protect surrounding substrates and surfaces, as well as in place equipment. The concrete floor sealer specialist shall use his discretion as to the physical means used for preparation and protection. Any costs incurred for resultant damage from negligence or inadequate protection shall be the sole responsibility of the concrete floor sealer specialist.
- C. Job area shall be free of other trades during floor installation, and for a period of 24 hours upon completion.
- D. Where natural ventilation is inadequate, provide ventilation by use of fans or other devices.
- E. Do not install at temperatures below 35 degrees F.

## 1.6 WARRANTY

- A. The concrete floor sealer specialist shall furnish the manufacturer's standard warranty of the concrete floor sealer for a period of twenty (20) years after the Date of Substantial Completion.

## PART 2 – PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: "Ashford Formula," Curecrete Chemical Company, Springville, Utah; [www.ashfordformula.com](http://www.ashfordformula.com).
  - 1. Products of the following manufacturers are approved provided compliance with all technical requirements as specified herein:
    - a. "Euco Diamond Hard," The Euclid Chemical Company, Cleveland, Ohio; [www.euclidchemical.com](http://www.euclidchemical.com).
    - b. "Seal Hard," L & M Construction Chemicals, Omaha, Nebraska; [www.lmcc.com](http://www.lmcc.com).

### 2.2 MATERIALS

- A. Colorless, transparent, penetrating liquid.
- B. Contains no silicone.
- C. Highly resistant to oils, greases and acids.
- D. Technical Properties:
  - 1. Abrasion – Taber abrasion test: 30.7% increase in abrasion resistance.
  - 2. Bonding – per ASTM D3359: 17% increase in epoxy adhesion. No change for polyurethane adhesion.

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3. Curing – 94% greater moisture loss from untreated samples during critical, initial 24 hour curing period.
  4. Hardening – per ASTM C42: 40% increase in compressive strength at 7 days, 38% increase at 28 days over untreated samples. ASTM C805, Schmidt hammer: 13.3% increased impact resistance.
  5. Permeability – The seepage rate using a 7 inch head of water on a 4.91 square inch area treated was 0.0083cc per hour.
  6. Weathering – per ASTM G23: ultraviolet light and water spray exposure had no adverse effect.
- E. Non-toxic, non-combustible, and non-flammable. Shall not harm lungs or hands. Shall comply with all V.O.C. regulations in effect at the time of manufacture.

## PART 3 - EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Examine concrete after wet curing a minimum of three (3) days and removal of any curing covering. Coordinate with Section 03 30 01, Cast-In-Place Concrete. Notify the Architect of any deficiencies prior to proceeding with the Work of this Section.

### 3.2 INSTALLATION

- A. Upon removal of curing cover, mechanically clean the concrete to remove contaminants, form oils, bond breakers, and staining from the wet cure operation. All cleaning compounds shall be removed in their entirety and the concrete surface shall be neutralized.
- B. Avoid contact with glass, aluminum, plant life, asphaltic concrete and finished surfaces.
- C. First Application:
1. As soon as possible after curing cover removal, spray product with a low pressure sprayer at a rate of 200-250 square feet per gallon.
  2. Keep the entire surface wet for 30 to 40 minutes by re-spraying dry spots or moving material from wet areas to dry areas with nylon push brooms.
  3. When the wet product becomes slippery underfoot, lightly sprinkle the surface with water to aid penetration and prevent surface drying.
  4. As the product begins to dry into the surface and again becomes slippery underfoot, flush the surface with water and squeegee the surface dry, removing all excess product, water, alkali and other impurities from the surface.
- D. NOTE: Before turning the facility over to the Owner, aggressively soap and water clean the concrete to remove construction contaminants and prepare the floor for the final application.
- E. Finish Application:
1. Apply sealer with a low pressure sprayer or drop sealer with a floor scrubbing machine at 50 – 600 square feet per gallon.
  2. Lambs wool or fine bristle broom the sealer evenly across the concrete surface or use a squeegee on the floor scrubbing machine to evenly spread a thin film.

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- F. Final Polishing
  - 1. It is necessary that the floor sealer be applied adequately if the sheen is to come up. Therefore, if the floor does not shine when polished/burnished, the floor may need to have another standard treatment application of the concrete floor sealer specified herein.
  - 2. Prior to final inspection and date of substantial completion, all exposed concrete floors sealed with products specified in this Section, shall be polished as follows:
    - a. Step 1: Use high-speed propane polishing/burnishing equipped with an abrasive 3M Black stripping pad.
    - b. Step 2: "Buff" the surface by working the machine side to side and back to back so as to create a wax-like sheen.
    - c. Step 3: Repeat step 2 utilizing a 3M Red pad to increase the intensity of the sheen.
  
- G. Provide all items and accessories as required for a complete installation in every respect.

END OF SECTION 03 35 00

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SECTION 03 35 33  
IMPRINTED CONCRETE

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes interior imprinted concrete and all accessories as specified herein and as indicated on the Drawings. Imprinted concrete includes, but may not be limited to, the following:
1. Materials: concrete, dry-shake color hardener, curing compound, release agent (optional) and sealer.
  2. Special imprinting and texturing tools.
  3. Concrete placement and finish.
  4. Color hardener and release agent placement.
  5. Curing compound application.
  6. Sealer application.
- B. The following Work is to be completed by the licensed contractor, except where noted, and is a part of this Work:
1. Preparation work, including sub-grade preparation, finish grading, constructing formwork, placing and setting screeds, and furnishing and placement of reinforcement shall be done by a licensed contractor or other qualified contractor. This shall be coordinated with the contractor prior to bidding the project. Provide all work as required for a complete and total installation in every respect.
  2. Provide and place concrete.
  3. Provide and apply all Color Hardeners. Regular grade color hardener is recommended for all application areas except those subject to heavy pedestrian traffic or heavy vehicular traffic.
  4. Provide and apply all release agents. Release agent shall be a dry powdered, colored agent used to facilitate release of the imprinting tools from concrete surface, and to provide moderate color variations to the textured surface.
  5. Provide and apply imprinting tools.
  6. Provide and apply curing compound.
  7. Provide and apply grout for imprinted joints.
  8. Provide and apply sealer.
  9. Outside edges of all imprinted slabs shall be left uncolored unless otherwise specified herein.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Submit manufacturer's product data, actual color samples and specifications.
- C. Submit a floor plan of the layout of the area indicating the pattern layout and expansion and contraction joint locations. Floor plan shop drawing shall be the same scale as the Architect's Drawings.

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## 1.3 QUALITY ASSURANCE

- A. Concrete Standards: Comply with provisions of the latest editions for the following codes, specifications, and standards, except where more stringent requirements are indicated.
  - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
  - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
  - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. All imprinted concrete work shall be installed by a licensed Bomanite contractor. The Bomanite contractor shall provide a qualified foreman or supervisor who has a minimum of three (3) years experience with imprinted and textured concrete, and who has successfully completed at least five (5) imprinted concrete installations of high quality and similar in scope to that specified herein, and located within a 100 mile radius of the proposed project. Evidence that the contractor is qualified to complete the project in a workmanlike manner as specified herein shall be submitted to, and approved by, the Architect.
- C. All imprinted concrete work shall comply with the current specifications and quality standards issued by Bomanite Corporation.
- D. The contractor shall provide a job site sample (referee sample) of **100 square feet minimum** to be approved by the architect/engineer prior to the start of construction. Said sample shall be the standard for the balance of the work installed, and shall be protected against damage until final approval from the architect/engineer.

## 1.4 PROJECT CONDITIONS

- A. Do not install concrete work over wet, saturated, muddy, or frozen subgrade.

## 1.5 REFERENCES AND STANDARDS

- A. Imprinted Concrete: Install in accordance with the latest edition of standards and specifications of the manufacturer and the American Concrete Institute (ACI).
- B. The contractor for this work shall be the following licensed contractor who has been trained and equipped by Bomanite Corporation.

## 1.6 DEFINITIONS

- A. Imprinted Concrete: a cast-in-place concrete slab, having the surface colored and imprinted with a pattern. The work is performed on the job site by trained and experienced workmen.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Bomanite Corporation, Madera, California. "Bomanite" "Bomacron" as specified herein.

### 2.2 CONCRETE MIX DESIGN AND MATERIALS

- A. The concrete shall have a minimum compressive strength of 3000 psi in non-freeze areas, 3500 psi in moderate freeze-thaw areas and 4000 psi in severe freeze-thaw areas.
- B. In freeze-thaw areas only, an air-entraining admixture complying to ASTM C 260, latest edition, shall be used to achieve an entrained air content for the particular mix used in accordance with the latest published recommendations of the Portland Cement Association and the American Concrete Institute.
- C. No admixtures containing calcium chloride will be permitted.
- D. Portland Cement: ASTM C 150, latest edition, Type I.
1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- E. Normal-Weight Aggregates: ASTM C 33, latest edition, Class 4, and as follows. Provide aggregates from a single source.
1. Maximum Aggregate Size: 1/2 inches.
  2. Do not use fine or coarse aggregates that contain substances that cause spalling.
  3. Local aggregates not complying with ASTM C 33, latest edition, 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.
- F. Water: Potable.

### 2.3 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94, latest edition.
1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

### 2.4 COLORING, IMPRINTING, CURING AND SEALING MATERIALS

- A. Color Hardener: The concrete shall be colored with the following BOMANITE Color Hardener color(s):as indicated on the Drawings. The grade of the hardener shall be: [Heavy Duty Grade](#).

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- B. Release Agent: The following BOMACRON Release Agent color(s) shall be applied to all concrete surfaces to be imprinted and textured: as indicated on the drawings.
- C. Pattern: The following BOMANITE pattern shall be used: as indicated on the drawings. All imprinting tools used in the execution of this project shall be manufactured by BOMANITE Corporation, no exceptions.
- D. Reinforcement: All imprinted slabs shall conform to the guidelines and recommendations of the American Concrete Institute for reinforcement of cast-in-place concrete slabs.
- E. Curing: All BOMANITE imprinted concrete slabs shall be cured with BOMANITE Cure and Seal or approved equal.
- F. Sealer: All slabs shall be sealed in accordance with the manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION PROCEDURES

- A. The area to receive the imprinted concrete shall have the sub-grade prepared as required and specified in Division 2 of the Project Manual.
- B. The formwork shall be installed in accordance with the drawings.
- C. Provide reinforcement as specified.
- D. Control joints and/or expansion joints shall be provided in accordance with the drawings and the latest guidelines established by the American Concrete Institute. The contractor shall advise and work with the Architect to determine the best location for these joints to minimize the visibility of the joints and to minimize cracking.
- E. The concrete shall be placed and screeded to the finished grade, and floated to a uniform surface using standard finishing techniques.
- F. Color Hardener shall be applied evenly to the surface of the fresh concrete by the dry-shake method using a minimum of 60 pounds per 100 square feet. It shall be applied in two or more shakes, floated after each shake and troweled only after the final floating.
- G. Release Agent shall be applied evenly to the troweled surface prior to imprinting.
- H. While the concrete is still in its plastic stage of set, the imprinting tools shall be applied to the surface.
- I. Cure and seal shall be applied in accordance with the manufacturer's recommendations immediately after completing the imprinting process for BOMANITE slabs only.
- J. After initial curing period, the imprinted joints shall be grouted using a sand/cement/water mixture.
- K. After the initial curing period, the surface of the slab shall be sealed.

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## 3.2 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. Protect concrete from damage.

END OF SECTION 03 35 33

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SECTION 03 40 00  
PRE-CAST CONCRETE

## PART 1 - GENERAL

### 1.1 REFERENCES

Where applicable, the latest editions of the following standards shall form a part of this specification to the extent referenced. The publications are referenced to in the text of this guide specification by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO) -

- Standard Specifications for Highway Bridges
- Guide Specifications for Structural Design of Sound Barriers
- Standard Specification for Transportation Materials and Methods of Sampling and Testing

ACI International (ACI) -

- ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete
- ACI 211.3 - Guide for Selecting Proportions for No-Slump Concrete
- ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete
- ACI 305R - Hot Weather Concreting
- ACI 306R - Cold Weather Concreting
- ACI 309R - Consolidation of Concrete
- ACI 318 - Building Code Requirements for Structural Concrete
- ACI 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary
- ACI 517.2R - Accelerated Curing of Concrete at Atmospheric Pressure

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

- ACPA Concrete Pipe Handbook
- ACPA Design Manual

ASTM International (ASTM)

- ASTM A 36 - Specification for Carbon Structural Steel
- ASTM A 82 - Specification for Steel Wire, Plain, for Concrete Reinforcement
- ASTM A 184 - Specification for Fabricated Deformed Steel Mats for Concrete Reinforcement
- ASTM A 185 - Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
- ASTM A 496 - Specification for Steel Wire, Deformed, for Concrete Reinforcement
- ASTM A 497 - Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
- ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- ASTM A 706 - Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- ASTM A 767 - Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- ASTM A 775 - Specification for Epoxy-Coated Reinforcing Steel Bars
- ASTM A 884 - Specification for Epoxy-Coated Steel and Welded Wire Fabric for Reinforcement
- ASTM C 14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe
- ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field
- ASTM C 33 - Specification for Concrete Aggregates
- ASTM C 39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C 40 - Test Method for Organic Impurities in Fine Aggregates for Concrete
- ASTM C 42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- ASTM C 70 - Standard Test Method for Surface Moisture in Fine Aggregate
- ASTM C 76 - Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
- ASTM C 78 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
- ASTM C 94 - Specification for Ready-Mixed Concrete

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- ASTM C 117 - Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
- ASTM C 123 - Standard Test Method for Lightweight Particles in Aggregate
- ASTM C 125 - Standard Terminology Relating to Concrete and Concrete Aggregates
- ASTM C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 138 - Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- ASTM C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates
- ASTM C 143 - Test Method for Slump of Hydraulic Cement Concrete
- ASTM C 150 - Specification for Portland Cement
- ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete
- ASTM C 173 - Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method
- ASTM C 192 - Practice for Making and Curing Concrete Test Specimens in the Laboratory
- ASTM C 231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C 260 - Specification for Air-Entraining Admixtures for Concrete
- ASTM C 330 - Specification for Lightweight Aggregates for Structural Concrete
- ASTM C 361 - Specification for Reinforced Concrete Low-Head Pressure Pipe
- ASTM C 403 - Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
- ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
- ASTM C 478 - Specification for Precast Reinforced Concrete Manhole Sections
- ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete
- ASTM C 497 - Test Methods for Concrete Pipe, Manhole Sections, or Tile
- ASTM C 506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
- ASTM C 507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
- ASTM C 566 - Test Method for Total Evaporable Moisture Content of Aggregate by Drying
- ASTM C 595 - Specification for Blended Hydraulic Cements
- ASTM C 617 - Standard Practice for Capping Cylindrical Concrete Specimens
- ASTM C 618 - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- ASTM C 655 - Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
- ASTM C 666 - Test Method for Resistance of Concrete to Rapid Freezing and Thawing
- ASTM C 685 - Specification for Concrete Made by Volumetric Batching and Continuous Mixing
- ASTM C 805 - Test Method for Rebound Number of Hardened Concrete
- ASTM C 822 - Standard Terminology Relating to Concrete Pipe and Related Products
- ASTM C 825 - Specification for Precast Concrete Barriers
- ASTM C 857 - Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- ASTM C 858 - Specification for Underground Precast Concrete Utility Structures
- ASTM C 877 - Specification for External Sealing Bands for Concrete Pipe, Manholes and Precast Box Sections
- ASTM C 890 - Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
- ASTM C 891 - Practice for Installation of Underground Precast Concrete Utility Structures
- ASTM C 913 - Specification for Precast Concrete Water and Wastewater Structures
- ASTM C 915 - Specification for Precast Reinforced Concrete Crib Wall Members
- ASTM C 920 - Specification for Elastomeric Joint Sealants
- ASTM C 923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

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- ASTM C 924 - Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
- ASTM C 979 - Specification for Pigments for Integrally Colored Concrete
- ASTM C 985 - Standard Specification for Nonreinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe
- ASTM C 990 - Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- ASTM C 1018 - Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading)
- ASTM C 1037 - Practice for Inspection of Underground Precast Concrete Utility Structures
- ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
- ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- ASTM C 1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete
- ASTM C 1582 - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete
- ASTM C 1214 - Standard Test Method for Concrete Pipe Sewerlines by Negative Air Pressure (Vacuum) Test Method
- ASTM C 1227 - Standard Specification for Precast Concrete Septic Tanks
- ASTM C 1231 - Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders
- ASTM C 1240 - Standard Specification for Use of Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout
- ASTM C 1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
- ASTM C 1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- ASTM C 1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- ASTM C 1399 - Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete
- ASTM C 1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers
- ASTM C 1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
- ASTM C 1504 - Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts, Storm Drains
- ASTM C 1550 - Standard Test Method for Flexural Toughness of Fiber Reinforced Concrete (Using Centrally Loaded Round Panel)
- ASTM C 1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- ASTM C 1603 - Standard Test Method for Measurement of Solids in Water
- ASTM C 1611 - Standard Test Method for Slump Flow of Self-Consolidating Concrete
- ASTM C1613 - Standard Specification for Precast Concrete Grease Interceptors
- ASTM D 2240 - Standard Test Method for Rubber Property—Durometer Hardness
- ASTM G 109 - Standard Test Method for Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments

## AMERICAN WELDING SOCIETY (AWS) -

- AWS D 1.1 Structural Welding Code - Steel
- AWS D 1.4 Structural Welding Code - Reinforcing Steel

## CONCRETE REINFORCING STEEL INSTITUTE (CRSI) -

- Manual of Standard Practice
- Placing Reinforcing Bars

## NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA) –

- NPCA QC Manual Quality Control Manual for Precast Concrete Plants

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- NPCA Selected ASTM Standards - ASTM Standards for Precast Concrete PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI) -
- MNL-120 PCI Design Handbook
- MNL-122 Architectural Precast Concrete

## 1.2 GENERAL REQUIREMENTS

Precast concrete units shall be designed and fabricated by an experienced and acceptable precast concrete manufacturer. The manufacturer shall have been regularly and continuously engaged in the manufacture of precast concrete units similar to that indicated in the project specifications or drawings for at least [ ] years.

## 1.3 SUBMITTALS

The following items may be submitted upon request by the customer.

### 1.3.1 Preconstruction Submittals

Submit quality control procedures established by the precast manufacturer in accordance with the NPCA Quality Control Manual for Precast Concrete Plants.

### 1.3.2 Shop Drawings

Drawings for Standard Precast Concrete Units - The drawings for standard precast concrete units shall be shop drawings furnished by the precast concrete producer for approval by the customer. These drawings shall demonstrate that the applicable industry design standards have been met. Installation and construction information shall be included on shop drawings upon request. Details of steel reinforcement size and placement as well as supporting design calculations, if appropriate, shall be included. The precast concrete units shall be produced in accordance with the approved drawings. Drawings shall indicate assumptions used in the design of standard units. It is the responsibility of the project's engineer-of-record to verify that the design assumptions are suitable for the proposed application.

Drawings for Custom-Made Precast Concrete Units - The drawings for custom-made precast concrete units shall be shop drawings furnished by the precast concrete producer for approval by the customer. These drawings shall show complete design, installation, and construction information in such detail as to enable the customer to determine the adequacy of the proposed units for the intended purpose. Details of steel reinforcement size and placement as well as supporting design calculations, if appropriate, shall be included. The precast concrete units shall be produced in accordance with the approved drawings.

Drawings Submitted by the Customer - The customer or customer's agent (specifier) may provide the precast concrete manufacturer with drawings for custom-made precast concrete units. Drawings shall be prepared and stamped by a licensed professional engineer. The customer or customer's agent may consult the precast concrete manufacturer during the design process on relevant production practices that may affect the design, production, handling and installation of the custom-made precast concrete unit. The customer or customer's agent accepts all liability associated with the use of the provided drawings.

### 1.3.3 Precast Concrete Unit Data

Standard Precast Concrete Units - For standard precast concrete units, the precast concrete producer shall supply cut sheets showing conformance to project drawings and requirements and to applicable industry design standards listed in this specification.

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Proprietary Precast Concrete Units - For proprietary precast concrete units, the precast concrete producer shall supply standard plans or informative literature. Supporting calculations and design details shall be available upon request. The precast concrete producer shall provide sufficient information as to demonstrate that such products will perform the intended task.

Anchorage, Lifting Inserts and Devices - For anchors, lifting inserts and other devices, the precast concrete producer shall provide product data sheets and proper installation instructions upon request. The Precast concrete unit dimensions and safe working load shall be clearly indicated.

Accessory Items - For items including, but not limited to sealants, gaskets, pipe entry connectors, steps, racks and other items installed before or after delivery, the precast concrete producer shall include proper installation instructions and relevant product data upon request.

## 1.3.4 Design Data

Upon request, the precast concrete producer shall supply precast concrete unit design calculations and concrete mix design proportions and appropriate mix design test data. Structural design calculations shall be signed by a licensed professional engineer.

## 1.3.5 Test Reports

Upon request, the precast concrete producer shall supply copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast-furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

Upon request, the precast concrete producer shall submit copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the project conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze-thaw durability, abrasion and absorption. Special tests for precast concrete items shall be clearly detailed in the specifications.

Upon request, the precast concrete producer will supply copies of in-plant QA/QC inspection reports.

## 1.3.6 Certificates

Submit quality control procedures established in accordance with NPCA Quality Control Manual for Precast Concrete Plants or verification of current NPCA Plant Certification.

## 1.4 DESIGN

### 1.4.1 Standard Precast Concrete Unit Design

Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards [ACI 318, ACI 350, ASTM, ACPA Design Manual, PCI MNL-120, and AASHTO]. Design must also consider stresses induced during handling, shipping and installation in order to avoid product cracking or other handling damage. Design loads for precast concrete units shall be indicated on the shop drawings.

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## 1.4.2 Non-Standard Precast Concrete Unit Design

Design calculations and drawings of non-standard precast units shall be prepared and signed by a licensed professional engineer, and submitted for customer approval prior to fabrication. Calculations shall include the analysis of units for lifting stresses and the sizing of lifting devices.

## 1.4.3 Franchise Precast Concrete Units

Products manufactured under franchise arrangements shall conform to all the requirements specified by the franchiser. Items not included in the franchise specification but included in this specification shall conform to the requirements in this specification.

## 1.4.4 Joints and Sealants

Joints and sealants between adjacent units shall be of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

## 1.4.5 Concrete Mix Design

### 1.4.5.1 Concrete Proportions

Selection of proportions for concrete shall be based on the methodology presented in ACI 211.1 for normal weight concrete, ACI 211.2 for lightweight concrete and ACI 211.3 for no-slump concrete. The concrete proportions shall be developed using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Accelerators containing calcium chloride shall not be used in precast concrete containing reinforcing steel or other embedded metal items.

Upon request, the precast concrete producer shall submit a mix design for each strength and type of concrete that will be used. Submitted mix designs shall include the quantity, type, brand and applicable data sheets for all mix design constituents as well as documentation indicating conformance with applicable reference specifications.

The use of self-consolidating concrete is permitted provided that mix design proportions and constituents meet the requirements of this specification.

### 1.4.5.2 Durability and performance requirements

#### 1.4.5.2.1 Concrete Compressive Strength

Precast concrete units shall have a 28-day compressive strength ( $f'_c$ ) of 5,000 psi.

#### 1.4.5.2.2 Water-Cement Ratio

Concrete that will be exposed to freezing and thawing shall contain entrained air (see 1.4.5.2.3) and shall have water-cement ratios of 0.45 or less. Concrete which will not be exposed to freezing, but which is required to be watertight, shall have a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water, or 0.45 or less if exposed to brackish water or sea water. For corrosion protection, reinforced concrete exposed to deicer salts, brackish water or seawater shall have a water-cement ratio of 0.40 or less.

#### 1.4.5.2.3 Air Content

The air content of concrete that will be exposed to freezing conditions shall be within the limits given below.

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Nominal Maximum Aggregate Size (in)	Air Content %	
	Severe Exposure	Moderate Exposure
3/8	6.0 to 9.0	4.5 to 7.5
1/2	5.5 to 8.5	4.0 to 7.0
3/4	4.5 to 7.5	3.5 to 6.5
1	4.5 to 7.5	3.0 to 6.0
1-1/2	4.5 to 7.0	3.0 to 6.0
* For specified compressive strengths greater than 5000 psi, air content may be reduced 1%		

## 1.5 QUALITY ASSURANCE

Precast concrete producer shall demonstrate adherence to the standards set forth in the NPCA Quality Control Manual for Precast Concrete Plants. The precast concrete producer shall meet requirements written in subparagraph [1.5.1 or 1.5.2.]

### 1.5.1 NPCA Plant Certification

The precast concrete producer shall be certified by the NPCA Plant Certification Program prior to and during production of the products for this project.

### 1.5.2 Qualifications, Quality Control and Inspection

#### 1.5.2.1 Qualifications

The precast concrete producer shall have been in the business of producing precast concrete units similar to those specified for a minimum of [ ] years. The precast concrete producer shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis. The agency shall issue a report, signed by a licensed professional engineer, detailing the ability of the precast concrete producer to produce quality units consistent with industry standards.

#### 1.5.2.2 Quality Control

The precast concrete producer shall show that the following quality control tests are performed as required and in accordance with the ASTM International standards indicated.

- a. Slump: A slump test shall be performed for each 150 cu yd of concrete produced per mix design, or once a day, whichever comes first. Slump tests shall be performed in accordance with ASTM C 143. Slump flow tests on self-consolidating concrete mixes shall be performed in accordance with ASTM C 1611.
- b. Temperature: The temperature of fresh concrete shall be measured when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064
- c. Compressive Strength: At least four compressive strength specimens shall be made for each 150 cubic yards of concrete of each mix design in accordance with the following applicable ASTM standards; C 31, C 39, C 192, C 497 [no-slump concrete].
- d. Air Content: Tests for air content shall be made on air-entrained, wet-cast concrete for each 150 cu yd of concrete, per mix design, but not less often than once each day when air-entrained concrete is used. The air content shall be determined in accordance with either ASTM C 231 or ASTM C 173 for normal weight aggregates and ASTM C 173 for lightweight aggregates.

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- e. Density (Unit Weight): Tests for density shall be performed a minimum of once per week to verify the yield of batch mixes. Density tests shall be performed for each 100 cu yd of lightweight concrete in accordance with ASTM C 138. Density tests shall be performed for each 100 cu yd of concrete per mix design, but not less often than once per day when volumetric batch equipment is used.

The precast concrete producer shall submit documentation demonstrating compliance with the above subparagraphs.

## 1.5.2.3 Inspection

The customer or customer's agent (specifier) may place an inspector in the plant when the units covered by this specification are being manufactured. The precast concrete producer shall give notice of [ ] days prior to the time the precast concrete units will be available for plant inspection.

## 1.6 HANDLING, STORAGE AND DELIVERY

### 1.6.1 Handling

Precast concrete units shall be handled and transported in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Lifting shall be accomplished with methods or devices intended for this purpose as indicated on shop drawings. Upon request, the precast concrete producer shall provide documentation on acceptable handling methods for the product.

### 1.6.2 Storage

Precast concrete units shall be stored in a manner that will minimize potential damage.

### 1.6.3 Delivery

Precast concrete units shall be delivered to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite all precast concrete units shall be inspected by the customer or customer's agent for quality and final acceptance.

### 1.6.4 Final Acceptance

Upon final acceptance, the customer or customer's agent acknowledges and understands the appropriate methods for handling the accepted precast concrete unit(s). Upon acceptance by the customer or customer's agent, the precast concrete manufacture is not responsible for replacing damaged product resulting from improper handling practices on the job site.

## PART 2 - PRECAST CONCRETE UNITS

### 2.1 MANUFACTURERS

The precast concrete manufacturer must meet the requirements established in section 1.5 Quality Assurance.

### 2.2 MATERIALS

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Except as otherwise specified, material shall conform to the following section.

2.2.1 Cement per ASTM C 150 (Type I, II, III or V) & ASTM C 595 (for Blended Cements)

2.2.2 Silica Fume per ASTM C 1240

2.2.3 Fly Ash and Pozzolans per ASTM C 618

2.2.4 Ground Granulated Blast-Furnace Slag per ASTM C 989

2.2.5 Water per ASTM C1602 [The use of reclaimed/recycled process water shall be permitted.]

2.2.6 Aggregates

2.2.6.1 Aggregate Selection

Aggregates shall conform to ASTM C 33. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement. Upon request, the precast concrete producer shall provide documentation indicating the aggregates are not susceptible to alkali-aggregate reaction.

2.2.6.2 Aggregates for Lightweight Concrete per ASTM C 330

2.2.7 Admixtures

2.2.7.1 Air-Entraining per ASTM C 260

2.2.7.2 Accelerating, Retarding, Water Reducing [Moderate to High] per ASTM C 494

2.2.7.3 Pigments per ASTM C 979

2.2.7.4 Corrosion Inhibitors per ASTM C 1582

2.2.8 Reinforcement

2.2.8.1 Reinforcing Bars

2.2.8.1.1 Deformed Billet-Steel per ASTM A 615

2.2.8.1.2 Deformed Low-Alloy Steel per ASTM A 706

2.2.8.2 Reinforcing Wire

2.2.8.2.1 Plain Wire per ASTM A 82

2.2.8.2.2 Deformed Wire per ASTM A 496

2.2.8.3 Welded Wire Reinforcement

2.2.8.3.1 Plain Wire per ASTM A 185

2.2.8.3.2 Deformed Wire per ASTM A 497

2.2.8.4 Epoxy Coated Reinforcement

2.2.8.4.1 Reinforcing Bars per ASTM A 775

2.2.8.4.2 Wires and Welded Wire Reinforcement per ASTM A 884

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2.2.8.5 Galvanized Reinforcement per ASTM A 767

## 2.2.9 Inserts and Embedded Metal

All items embedded in concrete shall be of the type required for the intended use and meet the following standards.

2.2.9.1 Structural Steel Plates, Angles, etc. per ASTM A 36

2.2.9.2 Hot-Dipped Galvanized per ASTM A 152

2.2.9.3 Proprietary Items In accordance with manufacturers published literature

## 2.2.10 Joint Sealants and Joint Gaskets

2.2.10.1 Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe per ASTM C 443

2.2.10.2 External Sealing Bands for Noncircular Sewer, Storm Drain and Culvert Pipe per ASTM C 877

2.2.10.3 Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections per ASTM C 990

2.2.10.4 Elastomeric Joint Sealants per ASTM C 920

## 2.2.11 Pipe Entry Connectors per ASTM C 923 & ASTM C 1478

## 2.2.12 Grout

2.2.12.1 Nonshrink Grout per ASTM C 1107

2.2.12.2 Cementitious Grout

Shall be of suitable mix design for the intended use, consisting of Portland cement, sand, and water. [Provide air entrainment for grout exposed to corrosive conditions or severe weather.]

## 2.3 MANUFACTURE

Manufacture shall conform to the NPCA Quality Control Manual for Precast Concrete Plants unless specified otherwise.

### 2.3.1 Forms

Forms for manufacturing precast concrete units shall be of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected cause no damage to the precast concrete unit.

Forms shall be cleaned of concrete build-up after each use.

Form release agents shall be applied according to the manufacturer's recommendations and shall not be allowed to build up on the form casting surfaces.

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## 2.3.2 Reinforcement

Applicable ASTM International and/or ACI 318 standards for placement and splicing

Cages of reinforcement shall be fabricated either by tying the bars, wires or welded wire reinforcement into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4. Reinforcing shall be positioned as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 in. Concrete cover shall not be less than 1/2 in., unless otherwise specified. Positive means shall be taken to assure that the reinforcement does not move significantly during the casting operations.

## 2.3.3 Embedded Items

Embedded items shall be positioned at locations specified in the design documents. Welding shall be performed in accordance with AWS D1.1 when necessary. Inserts, plates, weldments, lifting devices and other items to be embedded in precast concrete units shall be held rigidly in place so that they do not move significantly during casting operations.

## 2.3.4 Concrete

### 2.3.4.1 Concrete Mixing

Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

### 2.3.4.2 Concrete Placing

Conventional concrete shall be deposited into forms as near to its final location as practical. Self-consolidating concrete shall be placed in a manner in which it flows and consolidates without segregation or air entrapment. The free fall of the concrete shall be kept to a minimum. Concrete shall be consolidated in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Consolidation efforts are often not required when using self-consolidating concrete. Vibrators used to consolidate concrete shall have frequencies and amplitudes sufficient to produce well-consolidated concrete.

#### 2.3.4.2.1 Cold Weather Concreting

Recommendations for cold weather concreting are given in detail ACI 306 R. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. All concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact shall be free from frost. Frozen materials or materials containing ice shall not be used. In cold weather the temperature of concrete at the time of placing shall not be below 45° F. Concrete that freezes before its compressive strength reaches 500 psi shall be discarded.

#### 2.3.4.2.2 Hot Weather Concreting

Recommendations for hot weather concreting are given in ACI 305 R. During hot weather, proper attention shall be given to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90° F.

### 2.3.4.3 Concrete Curing

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Commence curing operations immediately following the initial set of the concrete and completion of surface finishing.

## 2.3.4.3.1 Curing by Moisture Retention

Moisture shall be prevented from evaporating from exposed surfaces until adequate strength for stripping the precast concrete unit from the forms is reached by one of the following methods:

- Cover with polyethylene sheets a minimum of 6 mils thick (ASTM C 171)
- Cover with burlap or other absorptive material and keep continually moist
- Use of a membrane-curing compound applied at a rate not to exceed 200 sq. ft. per gallon, or per manufacturers' recommendations (ASTM C 309)

[Surfaces that will be exposed to weather during service shall be cured as above a minimum of [ ] days. Forms shall be considered effective in preventing evaporation from the contact surfaces. If air temperature is below 50°F the curing period shall be extended.]

## 2.3.4.3.2 Curing with Heat and Moisture

Concrete shall not be subjected to steam or hot air until after the concrete has attained its initial set. Steam, if used, shall be applied within a suitable enclosure, which permits free circulation of the steam in accordance with ACI 517.2R. If hot air is used for curing, precautions shall be taken to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150° F. These requirements do not apply to products cured with steam under pressure in an autoclave.

## 2.3.4.4 Surface Finish

Unformed surfaces of wet-cast precast concrete products shall be finished as specified. If no finishing procedure is specified, such surfaces shall be finished using a strike-off to level the concrete with the top of the form.

### 2.3.4.4.1 Formed Non-Architectural Surfaces

Surfaces shall be cast against approved forms in accordance with standard industry practices in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles, and minor chips and spalls will be accepted. Major imperfections, excessive honeycombing or other major defects shall not be permitted.

### 2.3.4.4.2 Unformed Surfaces

Surfaces shall be finished with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be accepted. Major imperfections, excessive honeycombing or other major defects shall not be permitted.

### 2.3.4.4.3 Special Finishes

Troweled, broom or other finishes shall be according to the requirements of project documents and performed per industry standards or supplier specifications.

Precast concrete producers shall submit sample finishes for approval when required by the project documents. The sample finishes shall be approved prior to the start of production.

### 2.3.4.4.4 Architectural Finishes

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Architectural finishes shall be according to the requirements of project documents and performed per industry standards or supplier specifications. Precast concrete producers shall submit sample finishes for approval when required by the project documents. Full-size mockups are recommended for the approval of architectural finishes, because color variations and surface imperfections are not always apparent on small scale samples. The sample finishes shall be approved prior to the start of production.

## 2.3.4.5 Stripping Precast Concrete Units From Forms

Precast concrete units shall not be removed from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal. Stripping strengths shall be routinely measured to ensure product has attained sufficient strength for safe handling.

## 2.3.4.6 Patching and Repair

No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

### 2.3.4.6.1 Repairing Minor Defects

Defects that will not impair the functional use or expected life of a precast concrete unit may be repaired by any method that does not impair the product.

### 2.3.4.6.2 Repairing Honeycombed Areas

When honeycombed areas are to be repaired, all loose material shall be removed and the areas cut back into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Proprietary repair materials shall be used in accordance with the manufacturer's instructions. If a proprietary repair material is not used, the area shall be saturated with water. Immediately prior to repair, the area should be damp, but free of excess water. A cement-sand grout or an approved bonding agent shall be applied to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

### 2.3.4.6.3 Repairing Major Defects

Defects in precast concrete products which impair the functional use or the expected life of products shall be evaluated by qualified personnel to determine if repairs are feasible and, if so, to establish the repair procedure.

## 2.3.4.7 Shipping Precast Concrete Units

Precast concrete units shall not be shipped until they are at least [ ] days old, unless it can be shown that the concrete strength has reached at least 75% of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Site Access

The general contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete units.

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## 3.1.2 Installation

- Precast concrete units shall be installed to the lines and grades shown in the contract documents or otherwise specified.
- Precast concrete units shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
- Precast concrete units shall be installed in accordance with applicable industry standards. Upon request, the precast concrete producer shall provide installation instructions.
- Field modifications to the product shall relieve the precast producer of liability regardless if such modifications result in the failure of the precast concrete unit.

## 3.1.3 Watertightness

Where watertightness is a necessary performance characteristic of the precast concrete unit's end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

## 3.2 FIELD QUALITY CONTROL

### 3.2.1 Job Site tests

When watertightness testing is required for a precast concrete structure, one of the following methods may be followed:

#### 3.2.1.2 Vacuum Testing

Prior to backfill, vacuum test system according to [ASTM C1244 (for manholes)] [ASTM C 1227 (for septic tanks)]

#### 3.2.1.2 Hydrostatic Testing

According to contract documents and precast concrete producer's recommendations [or ASTM C 1227 (for septic tanks)].

END OF SECTION

**Division 04**  
Masonry



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SECTION 04 22 00  
CONCRETE UNIT MASONRY

## PART 1 - GENERAL

### 1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to construct all masonry work as shown on the Drawings and specified herein.
- B. The work under this Section includes, but is not necessarily limited to, the following:
  - 1. Concrete masonry units (CMU), including decorative masonry block.
  - 2. Reinforced CMU lintels.
  - 3. Masonry reinforcing, ties and anchors.
  - 4. Grouting required throughout the project.

### 1.2 SAMPLES

- A. Submit 2 samples each of concrete masonry units.
- B. Submit 2 samples each of decorative, masonry block.

### 1.3 PROTECTION OF MATERIALS

All perishable materials for the work of this Section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials, such as cement and lime, shall be delivered and stored in their original container, plainly marked with identification of material and maker. Materials in broken containers, or in packages showing water marks or other evidence of damage, shall not be used and shall be removed from the site.

### 1.4 COLD WEATHER CONSTRUCTION

Masonry construction in cold weather shall conform to the applicable requirements of "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes on Brick and Tile Construction by the Brick Institute of America.

## PART 2 - PRODUCTS

### 2.1 MATERIALS - MASONRY

- A. Concrete Masonry Units:
  - 1. Standard and light weight concrete masonry units (CMU) shall conform to ASTM-C-90, Grade N, Type I, two cell hollow, load bearing units of 8-inch x 16-inch nominal face size and bed dimension as shown on the Drawings. Masonry prism strength f'm shall be as shown on the drawings, but not less than 1500 psi.
  - 2. CMU shall be free from substances that will cause staining for at least 18 hours and then air cured in covered storage for not less than 28 days before delivery. Units shall have a maximum linear drying shrinkage of 0.25 percent (ASTM C-426) and have a moisture content at time of delivery not exceeding 30 percent of total absorption.

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3. CMU noted as fire-rated on the Drawings shall conform to Underwriters Laboratories, Inc., Standard for Concrete Masonry Units UL618, and shall have two (2) hour fire resistant rating.
4. Units shall be obtained from one manufacturer to insure even color and texture.
5. Provide special units required by the Drawings, including solid, corner, pilaster, lintels, and jamb units.
6. Decorative masonry block units shall be as shown on the Drawings.
7. Split-Face and Ground Face CMU
  - a. Basis of Design: Trenwyth "Prairie Stone Masonry Units".  
  
Base: split-face CMU will be as selected by the Architect.  
  
Ground Face CMU will be as selected by the Architect.  
  
4 x 8 CMU accents will also be required.

## 2.2 REINFORCING, TIES, ANCHORS AND MISCELLANEOUS

- A. Joint reinforcing shall be fabricated from cold drawn steel wire as per ASTM-A82, consisting of two 9 gauge deformed longitudinal rods weld connected to continuous diagonal cross rod forming truss design. Cross rod shall be 9 gauge galvanized wire. Out-to-out spacing of side rods shall be approximately 2" less than normal wall thickness.
- B. Galvanized dove-tailed anchor slots with anchors at 24 inches on center shall be furnished for anchorage to concrete framework or walls.
- C. Approved 16-gauge corrugated non-ferrous metal ties manufactured for use with the anchor slots provided shall be spaced at a maximum of 8 inches o.c. vertically and 30 inches o.c. horizontally.
- D. The Contractor shall provide and install miscellaneous anchors and attachment members, required both for the anchorage of his own work and that of other trades requiring attachment to masonry, which are not specifically provided under separate sections.
- E. Control joints shall be factory extruded preformed rubber gaskets conforming to ASTM D-2000 2AA-205 and shall be as manufactured by Dur-O-Wal, Hohmann and Bernard, Inc., AA Wire Products or equal. Control joints shall be installed as shown on the Drawings.

## 2.3 MORTAR MATERIALS

- A. Portland cement shall conform to ASTM C150 Type II. Masonry cements to be used when specifically approved for colored mortar.
- B. Lime for masonry mortar shall be hydrated, conforming to ASTM C207, Type S.
- C. Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to the limits of ASTM C144. Sand for grout shall conform to ASTM C144 or C33 as required.

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- D. Water shall be clean, and free oils, acids, alkalis or organic matter, and shall be potable.
- E. Mortar proportions shall conform to ASTM C270, Type M, or S. Ingredients shall be accurately measured by volume in boxes especially constructed for the purpose by the Contractor. Measurement by shovel will not be allowed.
- F. Grout for setting bearing plates, machinery, or any other equipment shall be mixed as recommended by the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength (ASTM C-109) of 5000 psi at 7 days.
- G. All other grout shall be 1 part portland cement and 1 part sand with a maximum aggregate size of 3/8 inch pea rock and a minimum comprehensive strength of 3000 psi in 28 days.
- F. Non-shrink non-metallic grout shall be 5 star grout as manufactured by the U.S. Grout Corp., or equal and be used in strict accordance with the manufacturer's instructions for the use intended.

## PART 3 - EXECUTION

### 3.1 MORTAR

- A. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled. The mixing time shall not be less than five minutes, approximately two minutes of which shall be for mixing the dry materials and not less than three minutes for continuing the mixing after the water has been added. Where hydrated lime is used for mortar requiring a lime content, the Contractor will have the options of using the dry-mix method or first converting the hydrated lime into a putty.
- B. Where the dry-mix method is employed, the materials for each batch shall be well turned over together until the even color of the mixed, dry materials indicates that the cementitious material has been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained.
- C. Mortar boxes shall be cleaned out at the end of each day's work, and all tools shall be kept clean. Mortar that has begun to set shall not be used.

### 3.2 MASONRY - INSTALLATION

- A. Work shall be provided by mechanics skilled in masonry work. Units shall be installed in full mortar bed, laid plumb and true to line and dimensions with accurately spaced courses; bond horizontal courses level, set units with cores vertically. Bearing surfaces of units shall have full mortar bed. Butter all vertical joints. Where construction is stopped on vertical line, courses shall be raked back.
- B. All CMU shall be laid in a full bed of mortar, applied to shells only. Butter the vertical joint of unit already set in the wall and all contact faces of the unit to be set. Each unit shall be placed and shoved against the unit previously laid so as to produce a well-compacted vertical mortar joint for the full shell thickness. Units shall set with all cells in a vertical position. The moisture content of the units when laid shall not exceed 35 percent of the total absorption as determined by laboratory test. Decorative masonry units shall be laid in a full bed of mortar on all four sides.

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- C. All masonry units shall be laid in stretcher (running) bond unless otherwise shown. Tool dense and neat.
- D. Sizes shall be specified and called for on the Drawings, and where "Soaps" and "Splits" are used, the space between these members and the backup material shall be slushed full of mortar.
- E. Joints of all masonry shall be tooled in accordance with the following:
  - 1. Wait until unit mortar is thumbprint hard before tooling joint. This may require as much as three hours in the shade and one hour in the sun in the summertime.
  - 2. The required personnel of the Contractor shall be kept on the job after hours, if necessary, to properly tool joints.
  - 3. Both vertical and horizontal joints shall be maintained uniform in spacing.
  - 4. Joints for CMU shall be 3/8 inch.
- F. Install all frames required to be set in masonry, set masonry tightly against frames, build in all frame anchors, and fill frames solid with mortar.
- G. Control joints shall be installed at the intersection of masonry walls with structural concrete and elsewhere as detailed on the Drawings. Joints shall be raked out to a depth of 3/4 inch for the full height of the wall suitable for caulking. The maximum length, horizontally, between vertical control joints shall be 40 ft., but joints shall be located only as directed or shown. Joints shall be equal in width to the standard mortar joint.
- H. All masonry slots, chases, or openings required for the proper installation of the work of other Sections shall be constructed as indicated on the Drawings or in accordance with information furnished before the work is started at the point affected. No chase shall cut into any wall constructed of hollow units after it is built, except as directed and approved by the Engineer.
- I. Surfaces shall be brushed as work progresses and maintained as clean as it is practicable. Unfinished work shall be raked back where possible, and toothed only where absolutely necessary. Before leaving fresh or unfinished work, walls shall be fully covered and protected against rain and wind and before continuing work previously laid shall be swept clean. The tops of walls or other unfinished work shall be protected against all damage by frost or the elements by means of waterproof paper, tarpaulins, boards or other means approved by the Engineer.
- J. The Contractor shall build-in all miscellaneous items to be set in masonry for which placement is not specifically provided under separate Divisions, including reglets, lintels, ties, electrical panel boxes, sleeves, vents, grilles, anchors, grounds, and exterior electric conduits and fixtures, and shall cooperate with other trades whose work is to be coordinated with the work under this Section.
- K. All anchorage, attachment, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar or grout.
- L. All ties and reinforcing for masonry shall be furnished and installed by the Contractor.
- M. Loose steel lintels shall be as shown on drawings and installed under this Section.
- N. Loose lintels shall be set in a full bed of mortar and supported by solid or mortar filled

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hollow concrete blocks as detailed on the Drawings.

- O. Bed and grout all steel, for equipment and machinery, and items coming in contact with masonry where grouting is required, including door bucks and frames set in masonry. The Contractor shall install all anchor bolts, base plates, and seats in masonry walls, and build-in all items required for the completion of the building as they apply to masonry.

## 3.3 REINFORCED MASONRY

- A. Provide vertical reinforcing in filled cores of masonry units of size, spacing and locations as indicated on the Drawings and specified herein. Unless otherwise shown on the Drawings, vertical reinforcing at all CMU walls shall be No. 5 bars placed at each corner, each opening and not greater than 4'-0" centers along straight runs.
- B. All cores containing reinforcing shall be filled, full height, with 3/8" pump mix concrete  $f'c = 2,500$  psi with a slump of not less than 6 inches nor more than 8 inches.
- C. Reinforce all walls with continuous horizontal joint reinforcing unless specifically noted or specified to be omitted. Space reinforcing 16" vertically unless otherwise shown.
- D. Lap horizontal reinforce a minimum of 6" at ends of units.
- E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and blend units as directed by manufacturer for continuity at returns, offsets, and column fireproofing, pipe enclosures and other special conditions.
- F. Tie beam reinforcing shall be as per ASTM A-615 Grade 60, deformed bars.

## 3.4 CLEANING

- A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and repointed with mortar of same color as that of the original and adjoining work.
- B. Exposed masonry shall be protected against staining by wall coverings, and excess mortar shall be wiped off the surface as the work progressed.
- C. All masonry shall be cleaned with approved detergent solution in accordance with manufacturer's printed directions. No acid or metal scrapers shall be used on masonry.
- D. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 square feet in a location approved by the Engineer. No further cleaning work may proceed until the sample area has been approved by the Engineer, after which time the same cleaning materials and method shall be used on the remaining wall area.

## 3.5 WALL FLASHING

Fabric wall flashing shall be installed above and below all openings in exterior masonry, at intersection of floors with exterior walls, and elsewhere as shown or noted on the Drawings. It shall be furnished and installed as shown on the Drawings.

**END OF SECTION**

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# **Division 05**

Metals



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SECTION 05 12 00  
STRUCTURAL STEEL FRAMING

## PART 1 - GENERAL

### 1.1 SCOPE OF WORK

- A. Furnish, fabricate, and erect structural steel and all accessories required for a complete installation as indicated.

### 1.2 REFERENCES

- A. AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."
- B. AISC "Manual of Steel Construction."
- C. AISC "Code of Standard Practice for Steel Buildings and Bridges."
- D. AWS "Standard Code for Arc and Gas Welding in Building Construction."

### 1.3 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings, checked and signed by General Contractor, and be responsible for field conditions and errors in dimensions shown thereon. Unchecked drawings will be returned. Approval of Shop Drawings will be for size and arrangement of principal and auxiliary members.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall use care in storing, handling and delivering all material and shall support same properly at all times to insure that no piece will be bent, twisted or otherwise injured.
- B. Ship, in advance of framing, all anchor bolts, wall ties, and leveling plates which are to be placed in concrete or masonry.
- C. Mark all members, assemblies, and pieces legibly with marks conforming to erection drawings. Use standard marking system on erection drawings which identifies shop detail sheet.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Certification of the chemical composition and physical properties of steel in a specific shipment, in the form of certified copies of the mill test report, may be requested by the Architect at any time.
- B. Structural Steel - ASTM A36 or A992.
- C. Fasteners - Bolts, ASTM A307.

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- D. Shop Paint - red oxide.
- E. Shop and field welds shall be made by qualified welding operators following the requirements set forth in AISC Specification Sections, 1.17, 1.23.6, and 1.26.4, with welds meeting the AWS Standard Code.
- F. Punch or drill steel for attachment of other work.

## 2.2 FABRICATION

- A. Except as otherwise indicated, use bolted joints for field connections and welded joints for shop connections. Erection bolts may be used initially for field connections with welding for final connections to develop full capacity of connected members. Draw all bolts tight so nuts cannot loosen, except where specifically noted for bolts to be hand-tight only. Provide finished members, assemblies, and built-up sections, true and free from bends, twists, or open joints between adjacent parts.
- B. Cleaning and Painting:
  - 1. Steelwork to be encased in concrete shall not be painted.
  - 2. Steel to be painted shall be cleaned and painted according to the requirements of the Steel Structures Painting Council Specification 15-68T, Type 1 (Red oxide).
  - 3. Field Cleaning - After completion of steel erection, remove mud and other foreign materials from steel. Use wire brushes to clean all welds and remove rust and abraded or otherwise damaged paint. Clean adjacent surfaces of oil and grease with solvent. Cleaning shall conform to same SSPC standards as Shop Cleaning above.
  - 4. Field Spot Painting - Immediately after cleaning, spot paint all parts requiring painting. Fabricator shall furnish adequate quantity of shop paint for this purpose. When part will be exposed to view, sandpaper smooth entire area to be treated, feather the edge of surrounding undamaged prime coat, and extend spot painting onto same in a manner to eliminate evidence of repair.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect all surface and conditions before starting work.
- B. Starting of work is construed as acceptance of existing conditions.

### 3.2 INSTALLATION

- A. Erect all work in accordance with AISC Code. Provide all protection, planking, and covering required.
- B. Where columns bear on concrete or masonry, grout under plates with Master Builders "Embeco" or Sonneborn "Ferrolith G".

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- C. Plumb, align, and brace before final welding. Provide temporary bracing as required to hold framing in proper position until permanent bracing or supporting parts of building have been completed.
- D. Protect adjacent building components which might become defaced or harmed by heat from welding operations.
- E. Where steel surface connections (Beam-to-Plate, Beam-to-Beam, etc.) Are subject to movement, coat with graphite or similar substance to reduce friction resistance.
- F. Do no field cutting of holes unless specific approval is obtained from Architect in writing.

**END OF SECTION**

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SECTION 05 21 19  
OPEN WEB STEEL JOIST FRAMING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This section includes the design, fabrication and erection of the following:

1. K-Series Open Web Steel Joists
2. LH-Series Longspan Steel Joists
3. DLH-Series Deep Longspan Steel Joists
4. Joist Girders
5. VS-Series
6. Bridging (Horizontal and Diagonal)
7. Joist Accessories

B. Related Sections: Refer to the following sections for related work:

1. Section 03300, "Cast-In-Place Concrete" for installing anchors set in concrete.
2. Section 04220, "Concrete Masonry Unit" for installing anchors set in Masonry Unit.
3. Section 05120, "Structural Steel."
4. Section 05500, "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.

### 1.02 REFERENCES

A. American Society of Testing and Materials (ASTM)

- |      |  |
|------|--|
| A307 | Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength |
| A325 | Standard Specification for High-Strength Bolts for Structural Steel Joints           |
| A780 | Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings     |

B. American Welding Society (AWS)

- |      |                                     |
|------|-------------------------------------|
| D1.1 | Structural Welding Code - Steel     |
| D1.3 | Structural Welding Code-Sheet Steel |

C. Code of Federal Regulations (CFR)

- |                    |  |
|--------------------|--|
| Title 29 Part 1910 | Labor-Occupational Safety and Health Standards |
|--------------------|--|

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## D. Federal Specification (FS)

TT-P-664 Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

## E. Steel Joist Institute (SJI)

Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders.

## F. Steel Structures Painting Council (SSPC)

SP-2 Hand-Tool Cleaning

SP-3 Power-Tool Cleaning

Paint 15 Paint Specification No. 15, Steel Joist Shop Paint

## G. International Building Code (IBC)

Volume 2 Structural Engineering Design Provisions

## 1.03 DEFINITIONS

Steel Joist: Steel joists as referred to in this section include steel joists, girders and headers.

## 1.04 SYSTEM DESCRIPTION

A. Structural Performance: Engineer, fabricate, and erect joists and connections to withstand design loads within limits and under conditions required. Comply with requirements of Contract documents and SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (referred to hereinafter as SJI Specifications.)

1. Design Loads: As indicated on the Contract Drawings.
2. Design joists to withstand design loads with vertical deflections not to exceed the following:
  - a. Floor Joists:  $1/360$  of the span.
  - b. Roof Joists:
    - (1)  $1/360$  of the span where plaster ceiling is attached or suspended.
    - (2)  $1/240$  of the span for all other cases.

B. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

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## 1.05 SUBMITTALS

- A. General: Submit the following in accordance with conditions of Contract and Section 01330, "Submittal Procedures."
- B. Product Data: Submit product data for each distinct type of joist accessories, and product specified.
- C. Shop Drawings: Submit detailed shop drawings showing layout of joist units, anchorage details, splice and connection details, bracing, bridging, accessories, and attachments to other work. Include mark, number, type, location and spacing of joists and bridging.
  - 1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
  - 2. For special joists indicated to comply with certain design loadings, include structural analysis data signed and sealed by qualified professional engineer responsible for their preparation; include calculated reactions on the steel joist, girders and headers.
- D. Certification: Submit manufacturer's certification that joists comply with SJI "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."
- E. Welder Certificates: Provide certification that welders to be employed in work comply with requirements specified in "Quality Assurance" article.
- F. Lead Paint-Free Certification: Provide manufacturer's written certification that all products to be used are free of lead paint.
- G. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.

## 1.06 QUALITY ASSURANCE

- A. Qualification of Manufacturer: Manufacturer shall be a member of the Steel Joist Institute.
- B. SJI Design Standard: Comply with recommendations of SJI's "Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders," applicable to types of joists indicated.
- C. Qualification of Field Welders: Welders shall be certified in accordance with American Welding Society (AWS) D1.1 within the last twelve (12) months. All welding shall comply with the applicable provisions of AWS D1.1 and D1.3.
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 installation of joists that are similar to those indicated for this project in material, design and extent.

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## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work. Inspect the joists for damage before unloading and note any permanent bend or deformation or broken welds on the receiving documents.
- B. Store materials to permit easy access for inspection and identification. Keep joist members off ground using pallets, skids, platforms or other supports.
- C. Protect steel members from corrosion and damage.
- D. Store packaged materials in original unbroken package or container.
- E. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- F. Replace damaged shapes or members as required per Sandia Delegated Representative (SDR).

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Steel: Comply with requirements of SJI Specifications.
- B. Primer: Red oxide, lead-free and cadmium-free, corrosion inhibiting primer complying with performance requirements of FS TT-P-664 or SSPC Paint Specification No. 15, Type I.
- C. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.
- D. High-Strength Bolts and Nuts: ASTM A325, Type I, heavy hex structural bolts, heavy hex nuts and hardened steel washers.
- E. Accessories: Provide accessories required for erection of steel joists, complying with SJI Specifications and Contract Drawings.

### 2.02 FABRICATION

- A. General: Manufacture steel joists in accordance with SJI Specification. All material shall be clean and straight.
- B. Bridging: Provide horizontal or diagonal type bridging as required by SJI Specifications or as indicated on Contract Drawings for type of joist, chord size, spacing and span. Supply bridging to ensure stability of structure during construction period.
- C. Extended Ends: Provide extended ends on joists as indicated on Contract Drawings complying with applicable SJI Specification and load tables.

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- D. Top Chord Extensions: The extensions shall be capable of withstanding the full uniform load of the joist plus any concentrated loads as shown on the Contract Drawings. The extensions shall be attached to the perimeter bracing unless shown otherwise on the Contract Drawings.
- E. Bottom Chord Extensions: Provide an extended bottom chord element of sufficient strength to support ceiling construction. Extend end to within 1/2 inch (12.7 mm) of finished wall surface unless otherwise indicated.
- F. End Anchorage: Provide end anchorage to secure joist to supports, complying with SJI Specifications unless otherwise indicated on the Contract Drawings.
- G. Miscellaneous Accessories: Supply miscellaneous accessories, including splice plates, reinforcing angles and bolts as required to complete the joist installation.

## 2.03 SHOP PAINTING

- A. Surface Preparation: Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by either hand tool cleaning, SSPC-SP2, or power tool cleaning, SSPC-SP3.
- B. Shop Primer: Apply one coat of primer paint to steel joists and accessories by spray, dipping or other method to provide a continuous dry paint film thickness of not less than 1.0 mil (0.025 mm).

## PART 3 - EXECUTION

### 3.01 EXAMINATION

Examine supporting substrates, embedded bearing plates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of joists.

- A. Verify all elevation locations and dimensions of surfaces to receive steel joist.
- B. Furnish plates, angles and other accessories as required to secure joists.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.02 ERECTION

- A. Place and secure steel joists in accordance with SJI Specifications, approved shop drawings and as herein specified.
- B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
- C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or

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- beams. Comply with OSHA requirements for bolted bridging to be in place before slackening lines on joist longer than 40 feet (12.19 m).
- D. Fastening Joists: Field weld joists to supporting steel framework in accordance with SJI Specifications for type of joists used.
1. Comply with AWS requirements and procedures for welding, appearance and quality of welds and methods used in correcting welding work.
  2. Coordinate welding sequence and procedure with placement of joists.
  3. Bolt joists to supporting steel framework where required.
  4. The lengths of welds applied to the top and bottom chords of joist shall not exceed half the width of the member.
- E. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A780 and manufacturer's instructions.
- F. Touch-Up Painting: Following installation, promptly clean, prepare and prime or reprime field connections, rust spots and abraded surfaces of prime-painted joists, accessories, bearing plates and abutting structural steel.
1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP2 or power tool cleaning, SSPC-SP3.
  2. Apply compatible primer of same type as used for shop painting.

END OF SECTION

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## SECTION 05 30 00 METAL DECKING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This section includes the fabrication and erection of composite steel deck, steel roof deck, non-composite steel form deck and steel deck accessories.
- B. Related Sections: Refer to the following sections for related work:
  - 1. Section 03300, "Cast-In-Place Concrete" for concrete topping and reinforcing steel.
  - 2. Section 04220, "Concrete Masonry Unit" for steel deck bearing plates.
  - 3. Section 05120, "Structural Steel" for shop welded shear connectors.
  - 4. Section 05500, "Metal Fabrications" for framing openings and miscellaneous steel shapes.
  - 5. Section 09900, "Painting"

#### 1.02 REFERENCES

- A. American Iron and Steel Institute (AISI)  
Specification for the Design of Cold-Formed Steel Structural Members
- B. American Society of Testing and Materials (ASTM)
  - A611 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
  - A653 Standard Specification for Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated by the Hot-Dip Process
  - A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
  - A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- C. American Welding Society (AWS)
  - D1.1 Structural Welding Code - Steel
  - D1.3 Structural Welding Code - Sheet Steel

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- D. Factory Mutual (FM)  
Approval Guide
- E. Federal Specification (FS)  
TT-P-664 Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
- F. Military Standardization Documents (MIL)  
P-21035B Paint, High Zinc Dust Content, Galvanizing Repair
- G. Steel Deck Institute (SDI)  
Publication No. 29 Design Manual for Composite Decks, Form Decks, Roof Decks and Cellular Deck Floor Systems with Electrical Distribution
- H. Underwriter's Laboratories, Inc. (UL)  
Fire Resistance Directory

## 1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Section 01330, "Submittal Procedures."
- B. Product Data: Submit product data or manufacturer's specifications and installation instructions for each distinct type of decking and for accessories.
- C. Shop Drawings: Submit detailed shop drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Include mark number, type and location of metal decking.
- D. Certification: Submit manufacturer's certification that decking complies with Steel Deck Institute (SDI) Specifications.
- E. Welders Certificates: Provide certification that all welders to be employed in work comply with requirements specified in "Quality Assurance" article.
- F. Welding Procedures: Provide written welding procedure specification (WPS) document per AWS Code requirements.
- G. Asbestos-Free and Lead-Free Paint Certification: Submit manufacturer's written certification that all materials are free of asbestos and lead paint.

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## 1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:
  - AISI "Specification for the Design of Cold-Formed Steel Structural Members"
  - AWS D1.1 and D1.3.
  - SDI "Design Manual for Floor Decks and Roof Decks"
- B. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.1 and D1.3 within the last twelve (12) months.
- C. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class 1" fire rated construction and Class I-60 windstorm ratings.
- D. Fire Rated Assemblies: Provide deck units complying with requirements of Underwriter's Laboratories, Inc. (UL) "Fire Resistance Directory" for use in any rated design indicated.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep deck panels off ground using pallets, skids, platforms or other supports.
- C. Protect steel deck from damage.
- D. Store packaged materials in original unbroken package or container.
- E. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- F. Replace damaged deck panels.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Uncoated (Black) Sheet Steel: Deck panels shall conform to SDI Publication No. 29, and ASTM A611. See plans for type, size and finish.
  - 1. Minimum Yield Strength: 33 ksi (230 MPa)
  - 2. Minimum Thickness: 0.028 in (0.71 mm), unless indicated otherwise.
  - 3. Grade

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- a. Composite Steel Deck: Grades C or D.
  - b. Non-Composite Steel Deck: Grades C, D, or E.
  - c. Steel Roof Deck: Grades C, D, or E.
- B. Galvanized Sheet Steel: Deck panels shall conform to SDI Publication No. 29, and ASTM A653 Structural Quality. See plans for type, size and finish.
1. Minimum Yield Strength: 33 ksi (230 MPa).
  2. Minimum Uncoated Thickness: 0.028 in (0.71 mm), unless indicated otherwise.
  3. Galvanization: Conform to ASTM A924 (replaced ASTM A525) with a minimum coating class of G60 as defined in ASTM A653.
- C. Miscellaneous Finishes
1. Shop Primer: Manufacturer's baked on, lead-free and chromate-free, rust inhibitive primer, conforming to performance requirements of FS TT-P-664.
  2. Galvanized Repair Paint: Comply with requirements of MIL P-21035B, Type I or II.
  3. Concrete Topping: Unless indicated otherwise, all deck to receive concrete shall be galvanized.

## 2.02 ACCESSORIES

- A. General: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.
- B. Column Closures, End Closures, and Z-Closures: Steel sheet, of same material and thickness as deck panels, unless indicated otherwise on the Contract drawings.
- C. Hanger Tabs: Manufacturer's standard hanger tabs for floor deck installation, where indicated on the Contract drawings.
- D. Cover Plates: Fabricate covers for abutting deck ends, of same material and gage as deck units, in matching profile, and not less than six (6) inches (152 mm) wide.
- E. Pour Stops: Shall be adequate to support concrete and any construction loads.
- F. Filler Sheets and Girder Fillers: Fabricate of same material, gage and profile, as deck units, to complete horizontal closure.
- G. Rubber Closures (Top and Underside): Manufacturer's standard synthetic rubber to match deck profile.
- H. Cant Strips and Eave Plates: Fabricate of same material and gage as deck units, with flange for attachment and of dimensions as indicated on Contract drawings.

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- I. Roof Sump Pan: Fabricate of not less than 0.071 inch (1.80 mm) thick galvanized steel, with flat bottom and sloped sides, recessed 1-1/2 inches (38 mm) below deck surface, with bearing flange not less than three (3) inches (76 mm) wide, and with all joints sealed watertight.
- J. Miscellaneous Roof Deck Accessories: Steel sheet, minimum 0.0359-inch (0.91 mm) thick ridge and valley plates, finish strips, and reinforcing channels, of same materials as roof deck.
- K. Fasteners: Manufacturer's standard galvanized hardened steel, self-tapping.
- L. Weld Washers: Manufacturer's standard uncoated steel sheet weld washers, minimum thickness of 0.056 in. (1.5 mm) with a minimum 3/8-inch (9.5 mm) diameter hole.

## 2.03 FABRICATION

- A. General: Fabricate deck panels conforming to SDI Publication No. 29 and the requirements of this specification.
  - 1. Deck units shall be selected to provide the load capacities as indicated on the Contract drawings, and as determined using the SDI construction loading criteria.
  - 2. Deck shall span three or more supports, unless indicated otherwise.
- B. Roof Deck Units: Provide deck panels without top-flange stiffening grooves conforming to SDI specifications, of thickness and depth as indicated on the Contract drawings.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Review all discipline drawings prior to deck installation to determine the locations of deck penetrations that will require openings. Inform the SDR or any openings that will require steel frames that are not shown on the structural drawings.
- B. All edge angles shall be in place with proper attachment prior to installation of metal deck. All roof and floor opening frames shall be installed prior to deck installation.
- C. Examine field conditions and substrates to receive metal decking, and verify that existing conditions are acceptable before commencing installation.

### 3.02 PREPARATION

- A. Do not place decking on supporting concrete structures until concrete is fully cured and dry.
- B. Locate deck bundles to prevent overloading of structural members.

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- C. Do not use floor deck units for storage or as working platforms until final connections have been made.

## 3.03 INSTALLATION

- A. General: Install deck units and accessories in compliance with the final shop drawings, manufacturer's recommendations, SDI Specifications, and requirements of this specification.

1. Fasten deck units to supports promptly after placement and alignment.
2. Do not leave placed sheet unattached at end of working day.

- B. Bearing: Install deck ends over framing supports with minimum end bearing of the following; align and level deck units.

1. Non-Steel Support: 6 inches (152 mm)
2. Steel Support: 3 inches (76 mm)

- C. Placement

1. Place deck units flat and square, secure to framing without excessive warp or deflection.
2. Place deck units in straight alignment for entire length of run.
3. Place deck units to permit proper attachment to perimeter deck angle. Deck shall be fully supported at all perimeter edges.

Provide steel filler fabricated of same material as perimeter deck angle in required size and shape to provide full structural support.

4. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
5. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

- D. End Laps: Lap ends of deck units a minimum of two inches (51 mm) over supports.

1. End laps may be staggered or on a continuous line.
2. Butt ends only where laps would be more than two (2) layers thick or otherwise unable to be lapped and weld each panel at its ends with the specified pattern.
3. Where deck slopes more than 1/2 inch per foot, start placement of deck units and ridge and valley plates at low end and lap ends shingle fashion with high side over low side.

- E. Butt Ends: Butt ends of deck units at stud shear connectors.

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1. Stud shear connectors may not be welded through more than one thickness of deck.
  2. Tape butted ends of deck units to close gaps of 1/8 inch (3.18 mm) or less.
- F. Openings: Reinforce openings greater than the width between deck flutes made by other trades, as indicated on the Contract Drawings.
1. Reinforce openings less than 15 inches (381 mm) with flat steel sheet of the same quality as the deck units, thickness of not less than 0.0358 (0.91 mm).

Place steel sheet over opening and fusion weld to the top surface of the deck, in accordance with the Contract Drawings and this specification.

2. Reinforce openings greater than 15 inches (381 mm) with angles or channels of A36 steel framing around the opening to the adjacent deck supports in accordance, and adequate to support the loads that would normally be carried by the deck where the opening has occurred.

Weld or mechanically fasten the deck to the frame in accordance with the Contract Drawings and this specification.

- G. Provide additional metal reinforcement as shown on the Contract Drawings and as required for strength, continuity of decking and support of other work shown.
- H. Install closure strips as shown on the Contract Drawings and as recommended by the manufacturer to provide a complete installation.

Where joist ends terminate on a shear wall and the deck does not contact the wall, provide metal closure strips from deck to the wall between the joists.

## 3.04 ANCHORAGE

- A. General: Fasten deck units to supporting members including perimeter support steel and/or bearing walls by either welding or by mechanical fastening, immediately after alignment. Comply with the requirements of SDI.
1. Comply with AWS D1.1 and D1.3 for requirements and procedures for welding.
  2. Care shall be exercised in the selection of electrodes and amperages to provide positive welds and to prevent burn through of the supporting members. If supporting membrane do become cut during deck welding, the Contractor shall repair or replace the member at no cost to Sandia National Laboratories (SNL).
- B. Weld Spacing: Weld edge ribs of panels at each support. Space welds as follows:
1. Floor Deck: Average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm).
  2. Roof Deck: Maximum 12 inches (305 mm) apart.

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- C. Side Lap and Perimeter Edge Attachment: Fasten side laps and perimeter edges of units between supports at intervals not exceeding 36 inches (914 mm) on center by welding or mechanical fasteners.

Deck units with spans greater than 5 feet (1.5 m) shall have side laps and perimeter edges at perimeter support steel fastened at midspan or 36-inch (914 mm) intervals, whichever is smaller, or as shown on the Contract drawings.

## 3.05 CLEANING AND TOUCH-UP

- A. Clear debris from deck before floor or roof substrate is placed.
- B. Provide cleaning and touch-up painting of field welds, abraded areas and rust spots, as required for all exposed areas after erection and before proceeding with field painting.

END OF SECTION

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SECTION 05 40 00  
COLD-FORMED METAL FRAMING

## PART 1 - GENERAL

### 1.1 RELATED WORK SPECIFIED ELSEWHERE

Rough carpentry

### 1.2 SUBMITTALS

The contractor shall furnish the following items and submit them for approval prior to delivery of materials to the site:

- A. Shop drawings: Shall be documents illustrating materials, shop coatings, steel thicknesses, details of fabrication, details of attachment to adjoining work, size, location, and spacing of fasteners for attaching framing to itself, details of attachment to the structure, accessories and their installation, and critical installation procedures. Drawings may include plans, elevations, sections, and details.
- B. Calculations: Engineering calculations or data shall be submitted verifying the framing assembly's ability to meet or exceed design requirements as required by local codes and authorities.
  - 1. Steel framing used to support rigid materials shall be designed for an allowable deflection of  $L/360$ . Steel framing used to support semi-rigid materials shall be designed for allowable deflection of  $L/240$ .
  - 2. Wall bridging shall be designed to provide resistance to minor axis bending and rotation of wall studs.
- C. Certifications: Certifications shall be statements from the manufacturer certifying that the materials conform to the appropriate requirements as outlined in the contract documents.
- D. Descriptive Literature: Manufacturer's literature containing product and installation specifications and details.

### 1.3 REFERENCES

- A. ASTM Standards:
  - 1. A-446 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized by the Hot-Dip process, Structural (Physical) Quality.
  - 2. A-570 Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
  - 3. A-611 Standard Specification for Steel, Cold-Rolled Sheet, Carbon, Structural.
  - 4. C-840 Standard Specification for Application and Finishing of Gypsum Board.
  - 5. C-841 Standard Specification for Installation of Interior Lathing and Furring.
  - 6. C-842 Standard Specification for Application of Interior Gypsum Plaster.
  - 7. C-847 Standard Specification for Metal Lath.
  - 8. C-926 Standard Specification for Application of Portland Cement Based Plaster.

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9. C-955 Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
  10. C-1002 Standard Specification for Steel Drill Screws for the Application of Gypsum Board.
  11. C-1007 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- B. American Iron and Steel Institute (AISI) Cold-Formed Steel Design Manual - Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Welding Society (AWS): Structural Welding Code (D1.1); Specification for Welding Sheet Steel in Structures (D1.2).

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Dietrich Industries
- B. U.S. Steel Corporation

### 2.2 MATERIALS

- A. All studs and/or joists and accessories shall be of the type, size, gauge and spacing shown on the plans. Studs, runners (track), bracing, and bridging shall be manufactured per ASTM Specification C-955.
- B. All painted studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A-570 or A-611, as set forth in Section 1.2 of the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).
- C. All galvanized studs, joists and accessories shall be formed from steel that conforms to the requirements of ASTM A-446, as set forth in Section 1.2 of the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest editions).
- D. All painted studs, joists, and accessories shall be prime-painted with rust-inhibitive paint.
- E. All galvanized studs, joists and accessories shall have a minimum G-60 coating.
- F. All section properties shall be calculated in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members (latest edition).
- G. Facing materials may be substituted for bridging. If facing materials are to be utilized for bridging, then they shall be installed prior to loading the wall. If such materials are installed on one side only, then the other stud flanges shall be restrained with suitable bridging. If facing materials are not to be used for bridging, then suitable horizontal bridging must be designed and installed prior to loading the wall.

## PART 3 - EXECUTION

### 3.1 STORAGE OF MATERIALS

- A. Products shall be protected from conditions that may cause any physical damage.

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- B. Materials shall be stored on a flat plane.
- C. Any damaged materials shall be removed from the job site immediately.

## 3.2 INSTALLATION: GENERAL

- A. Methods of construction may be either piece by piece (stick-built) or by fabrication into panels either on or off site.
- B. Connections shall be accomplished with self-drilling screws or welding so that the connection meets or exceeds the design loads required at that connection.
- C. Transversely loaded studs need not sit squarely in tracks but must be attached to them.
- D. Axially loaded stud walls shall be installed seated squarely against the web portion of the top and bottom tracks.
- E. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of load bearing members is not permitted.
- F. Temporary bracing shall be provided and left in place until work is permanently stabilized.
- G. Bridging shall be of size and type shown on the drawings and as called for in the design calculations.
- H. Install headers in all openings in axially loaded walls that are larger than the stud spacing in that wall. Form headers as shown on the drawings.
- I. Insulation equal to the job requirements shall be placed in all jamb and header type conditions that will be inaccessible after their installation into the wall.
- J. Jamb studs provide support at each end of the header. These studs shall be securely connected to the header and must seat squarely in the lower track of the wall. And be properly attached to it.
- K. If by design, the header is low in the wall, the less than full-height studs (cripples) that occur over the header shall be designed to carry all imposed loads.
- L. Wall track shall not be used to support any load unless specifically designed for that purpose.
- M. All axially loaded members shall be aligned vertically, to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.
- N. Holes that are field cut into steel framing members shall be within limitations of the product and its design. Provide reinforcement where holes are cut through load bearing members in accordance with manufacturer's recommendations and as approved by project architect or engineer.
- O. Touch up all steel bared by welding by using zinc rich paint on galvanized steel and paint equal to that used by the manufacturer on painted steel members.
- P. Studs shall be spaced to suit the design requirements and limitations of collateral facing materials.

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- Q. Gypsum board shall be attached to steel studs with steel drill screws spaced 16" on center in the field of the panel and along its edges for non-fire-rated construction. For fire-rated construction, obtain screw spacing from fire test report.
- R. Metal lath (ASTM Specification C-847) shall be attached in accordance with ASTM Specification C-841 except screw heads shall be of size and type suitable for positive (no movement) attachment.
- S. Care shall be taken to allow for additional studs at intersections, corners, doors, windows, control joints, etc.
- T. Provision for structure movement shall be allowed where indicated and necessary by design or code requirements.
- U. Splicing of axially loaded members shall not be permitted.

## 3.3 INSTALLATION: NON-PANELIZED (STICK-BUILT) MEMBERS

- A. Align track accurately at supporting structure and fasten to structure as shown on shop drawings.
- B. Track intersections shall butt evenly.
- C. Studs shall be plumbed, aligned, and securely attached to flanges or webs of upper and lower tracks. Axially loaded studs shall be seated squarely in both top and bottom tracks.

## 3.4 INSTALLATION: JOISTS

- A. Joist shall be located directly over bearing studs or a load distribution member shall be provided to transfer loads.
- B. Provide web stiffeners where necessary at reaction points, and at points of concentrated loads, as shown on the shop drawings.
- C. Bridging, either strap or solid, shall be provided as shown on the shop drawings.
- D. Provide additional joists under parallel partitions where the partition length exceeds  $\frac{1}{2}$  of the joist span.
- E. Provide additional joists around all floor/roof openings which are larger than the joist spacing and as noted on the shop drawings.
- F. End blocking shall be provided where joist ends are not otherwise restrained from rotation.

## 3.5 FASTENINGS AND ATTACHMENTS

- A. Anchorage of the tracks to the structure shall be with methods designed for the specific application of sheet steel to that surface. Size, penetration, type and spacing shall be determined by design.
- B. Welds shall conform to the requirements of AWS D1.1, AWS D1.3, and AISI Manual Section 4.2. Welds may be butt, fillet, spot, or groove type, the appropriateness of which shall be

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determined by, and within the design calculations. All welds shall be touched-up using zinc rich paint for galvanized members, and paint similar to that used by the manufacturer for painted members.

- C. Steel drill screws shall be of the minimum diameter indicated by the design of that particular attachment detail. Penetration through joined materials shall not be less than 3 exposed threads.
- D. Wire tying in structural applications is not permitted.

## 3.6 TOLERANCES

- A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span (c" in 10'-0").
- B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths (c in 10'-0").
- C. Spacing of studs shall not be more than "c" from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.
- D. Squareness - Prefabricated panels shall not be more than c" out of square within the length of that panel.

## 3.7 INSPECTIONS

- A. Inspections shall be performed in order to assure strict conformance to the shop drawings at all phases of construction.
- B. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement, reinforcement, etc.
- C. All attachments shall be checked for conformance with the shop drawings. All welds shall be touched up in accordance with Section 3.05 B.
- D. General inspection of structure shall be completed prior to applying loads to those members.
- E. Inspections where and as required by local codes shall be controlled inspections.

**END OF SECTION**

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SECTION 05 50 00  
METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following metal fabrications:
  - 1. Rough hardware
  - 2. Ladder
  - 3. Loose bearing and leveling plates
  - 4. Miscellaneous framing and supports for the following:
    - a. Overhead doors.
    - b. Applications where framing and supports are not specified in other Sections.
  - 5. Steel channels for overhead door openings

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 1 requirements.
- B. Product data for non-slip aggregates and non-slip aggregate surface finishes, prefabricated building columns, cast nosings, treads and thresholds, steel floor plate, paint products, and grout.
- C. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
  - 1. Shop drawings for metal fabrications shall be complete and total and shall indicate each separate item as specified herein.

### 1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.
- B. Welding Standards: Comply with latest edition of applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," 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 re-certification.

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- C. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
  - 1. See Concrete and Masonry Sections of these Specifications for installation of inserts and anchorage devices.
- D. Shop Assembly: Pre-assemble items in 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 re-assembly and coordinated installation.

## 1.4 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

## 1.5 WELDING QUALITY CONTROL

- A. Welding operators shall be qualified under the provisions of the AWS Structural Welding code, on test pieces in positions and with clearances equivalent to those actually to be encountered in construction. Welders shall make only those type of welds for which they are specifically certified.
- B. Welds requiring inspection shall be so indicated in the Drawings.
  - 2. Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect, pre-qualified to make the weld being inspected. Welders and inspectors shall be pre-qualified by the American Welding Society Qualification Test.
- C. The Contractor performing the welding requiring inspection shall cooperate with the independent testing service performing weld testing.
- D. Written reports will be submitted for each weld tested and will indicate whether or not weld is acceptable for intended use.
- E. If by inspection welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced.

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## 1.6 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 re-lubricate before use.
  - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

## 1.7 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. 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.

## PART 2 - PRODUCTS

### 2.1 FERROUS METALS: Comply with the provisions of the latest editions for the following codes, specifications, and standards.

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

### 2.2 SHOP PAINTING

- A. Surface Preparation for Metal Fabrications (SSPC - SP 3): After inspection and before shipping, clean steel work to be painted.
  - 1. Clean all steel installed in the interior of the building in accordance with SSPC - SP 3, Power Tool Cleaning.
  - 2. Prior to power tool cleaning, remove visible oil, grease, soluble welding residue and salts in accordance with SSPC - SP 1, Solvent Cleaning.
  - 3. After power tool cleaning and prior to shop painting, remove dirt, dust, and all similar contaminants from the surface.
- B. Shop Prime Painting: Immediately after surface preparation, apply steel rust inhibited primer paint in accordance with manufacturer's instructions and at rates as specified. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

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1. Tnemec "Series 115 Uni-Bond DF" primer. Chemically active, rust-inhibitive acrylic primer. Color 31GR Slate Gray. Apply at a rate to achieve a dry film thickness of 2.0 to 4.0 mils. VOC: 1.17 lbs/gallon. HAPS: 1.1 lbs/gallon solids.
  - C. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.
- 2.3 FASTENERS: Comply with the provisions of the latest editions for the following codes, specifications, and standards.
- A. Provide plated fasteners complying with ASTM B 633, latest edition, Class Fe/Zn 25 for electro-deposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
  - B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.
  - C. Machine Screws: ANSI B18.6.3.
  - D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).
  - E. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).
  - F. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
  - G. 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 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 agency.
    1. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).
- 2.4 FABRICATION
- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
  - B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
  - C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and

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fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F (55.5 deg C).
- D. Shear and punch metals cleanly and accurately. Remove burrs.
  - E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
  - F. Remove sharp or rough areas on exposed traffic surfaces.
  - G. Weld corners and seams continuously 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. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
  - H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
  - I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - J. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for re-assembly and coordinated installation.
  - K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
  - L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

## 2.5 MISCELLANEOUS METAL FABRICATIONS

- A. Rough Hardware
  1. Furnish [[bent][, or otherwise ][custom-fabricated], bolts][, plates][, anchors][, hangers][, dowels], [and other miscellaneous [steel] [and] [iron] shapes] as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

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2. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

## B. Steel Ladders

1. Fabricate ladders for the locations shown, with dimensions, spacings, details, and anchorages as indicated. Comply with requirements of ANSI A14.3, latest edition.
2. Siderails: Continuous, steel, 1/2-by-2-1/2-inch (12-by-64-mm) flat bars or bent plate, with eased edges, spaced 18 inches (460 mm) apart.
3. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced 12 inches (300 mm) o.c.
4. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
5. Support each ladder at top and bottom and at intermediate points spaced not more than 5 feet (1.5 m) o.c. with welded or bolted steel brackets.
  - a. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches (180 mm).
6. Galvanize ladders, including brackets and fasteners, in the following locations:
  - a. all locations

## C. Loose Bearing and Leveling Plates

1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

## D. Miscellaneous Framing and Supports

1. Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
2. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - a. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
  - b. Except as otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.
4. Galvanize miscellaneous framing and supports in the following locations:
  - a. all locations

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- E. Steel Channels for Overhead Door Openings
1. Fabricate steel door frame channels from structural shapes of size and to dimensions indicated, fully welded together.
  2. Provide steel strap anchors for securing door frame channels into adjoining concrete or masonry, using 1/8-by-2-inch (3-by-50-mm) straps of the length required for a minimum 8-inch (200-mm) embedment, unless otherwise indicated. Weld anchors to frame jambs no more than 12 inches (300 mm) from both bottom and head of frame and space anchors not more than 30 inches (750 mm) apart.
  3. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.]
  4. Galvanize frames and anchors in the following locations:
    - a. Exterior locations.
    - b. Interior locations where indicated.
  5. At the head and jamb conditions, all joints are to be straight, tight and welded. The width of the header channel and jamb channels shall be the same, and all corners shall be mitered. Exposed welds shall be true and straight and shall be zinc coated after welding.
  6. The steel channels for the overhead door openings installation shall be watertight in every respect and there shall be no voids in the surrounding construction.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Installer must examine the areas and conditions under which miscellaneous and ornamental items are to be installed. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### 3.2 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.
- B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

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## 3.3 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. 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 the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
  - 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. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- G. Provide all items and accessories as required for a complete and total installation in every respect.

## 3.4 SETTING LOOSE PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

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1. Use non-shrink, metallic grout in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

## 3.5 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 requirements for touching up shop-painted surfaces.
  1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.
- B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780, latest edition.

END OF SECTION 05 50 00

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SECTION 05 52 02  
ALUMINUM HANDRAILS AND RAILINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes aluminum pipe handrails and railings

### 1.2 SUBMITTALS

- A. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
- B. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- C. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.
- D. Shop drawings shall indicate loading requirements as specified herein and be certified and sealed by a Registered Structural Engineer in the state of Florida to be in conformance with all requirements as specified herein and in accordance with all State and local codes and regulations.

### 1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.
- B. Welding Standards: Comply with applicable provisions of AWS D1.2 "Structural Welding Code–Aluminum".
  - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.
- C. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of stair work. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
  - 1. See Concrete and Masonry Sections of these Specifications for installation of inserts and anchorage devices.
- D. Shop Assembly: Pre-assemble items in 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 re-assembly and coordinated installation.

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- E. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections.
  - 1. Handrails: 200 pounds, concentrated load applied at any point in any direction and 50 pounds per linear foot applied in any direction.
  - 2. Guardrails:
    - a. 200 pounds, concentrated load applied at any point in any direction
    - b. 50 pounds per linear foot applied in any direction
    - c. 200 pound, concentrated load applied on a one foot area at any point in the system
  - 3. Loading conditions need not be assumed to act concurrently but each shall be applied to produce the maximum stress in each respective component or any of the supporting components.

## 1.4 FLORIDA ACCESSIBILITY CODE FOR BUILDING CONSTRUCTION

- A. Handrails and railings shall conform with the Accessibility Requirements Manual from the Florida Department of Community Affairs, Florida Board of Building Codes and Standards.
- B. Handrails and railings shall conform to NFPA 101, 2000, Life Safety Code.

## PART 2 – PRODUCTS

### 2.1 ALUMINUM MANUFACTURERS

- A. Subject to compliance with requirements, aluminum handrails and railings shall be as fabricated by one of the following:
  - 1. Superior Aluminum Products, Inc., Russia, Ohio
  - 2. Petersen Metal Products, Inc., Odessa, Florida
  - 3. Poma Corporation, West Palm Beach, Florida
  - 4. Architectural Metal Works, Tarpon Springs, Florida

### 2.2 MATERIALS

- A. Aluminum
  - 1. Aluminum Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.
  - 2. Aluminum Pipe: Formed from extruded 6063-T5, 1-1/2" and 3" outside diameter aluminum pipe. Formed Elbows from extruded 6063-T4 aluminum.
  - 3. Accessories: Cast from ANSI 713 alloy.
- B. Nonshrink, Nonmetallic Grout: refer to Section 05 50 00 – Metal Fabrications

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## C. Fasteners

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
2. Masonry Anchorage Devices: Expansion shields, FS FF--325.
3. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.
4. Concrete Anchor Bolts: Hexagon head "Kwik Bolt" by Hilti Fastening System, Tulsa, Oklahoma.

## D. Finish: Kynar 500, two-coat system, in color as selected by the Architect.

## 2.3 ALUMINUM PIPE HANDRAILS AND RAILINGS

- A. Fabricate pipe railings to dimensions and details shown with smooth bends and welded joints ground smooth and flush.
- B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
  1. At tee and cross intersections, provide coped joints.
  2. At bends, interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, or radiuses indicated.
  3. Form bends by use of prefabricated elbow fittings and radius bends.
- C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without bucking, twisting, or otherwise deforming exposed surfaces of pipe.
- D. Provide wall returns at end of wall-mounted handrails, except where otherwise indicated.
- E. Close exposed ends of pipe by welding 3/16-inch thick aluminum plate in place or by use of prefabricated fittings.
- F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
- G. Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this Section for aluminum pipe railing and handrails, and as follows:
  1. Railings may be bent at corners, rail returns and wall returns, instead of using prefabricated fittings.
  2. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION OF HANDRAILS

- A. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 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 for design loading. Secure wall brackets and wall return fittings to building construction as follows:
1. Use type of bracket with predrilled hole for exposed bolt anchorage.
  2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
  3. For hollow masonry anchorage, use toggle bolts having square heads.

### 3.2 INSTALLATION OF RAILINGS

- A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railings ends to building construction as follows:
1. Anchor posts in concrete by means of pipe sleeves, preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink grout.
    - a. Leave anchorage joint exposed; wipe off excess grout and leave 1/8 inch build-up, sloped away from post. For installation exposed on exterior or to flow of water, seal grout to comply with grout manufacturer's directions.
  2. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, attach posts as indicated using fittings designed and engineered for this purpose.
  3. Anchor rail ends into concrete and masonry with aluminum round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
  4. Anchor rail ends to aluminum with aluminum oval or round flanges welded to rail ends and bolted to structural aluminum members, unless otherwise indicated.
  5. Railings shall be isolated when mounted to dissimilar materials.

END OF SECTION 05 52 02

**Division 06**  
Wood, Plastics and Composites



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SECTION 06 10 00  
ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes:
  - 1. Wood grounds, nailers, and blocking
  - 2. Plywood backer panels

### 1.2 REFERENCES

- A. Lumber Standard: Comply with PS-20 and with applicable rules of the respective grading and inspecting agencies for species and products indicated.
- B. Plywood Product Standards: Comply with PS 1 (ANSI A199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard PRP-108 for type of panel indicated.

### 1.3 DEFINITIONS

- A. Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

### 1.4 SUBMITTALS

- A. Product Data:
  - 1. Chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material
  - 2. Treating plant's certification of compliance stating type of preservative used and method of treatment employed, net amount of preservative retained, and compliance with applicable standards
  - 3. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site
- B. Certification that chemical treatment complies with specification for each type of treatment.

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## 1.5 JOB CONDITIONS

- A. Examine substrates and supporting structure and the conditions under which work is to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
  - 1. For pressure treated lumber and plywood, place spacers between each bundle to provide air circulation.

## 1.7 QUALITY ASSURANCE

- A. Ensure all preservative is adequately fixed in wood. Reject lumber with surface residues of white salts. Provide wood that is kiln-dried after treatment or prefinished with a sealer.
- B. Obtain approvals from Building Official for alternative wood preservative treatment.
- C. No products used within the interior of the building shall contain urea formaldehyde glue.

## PART 2 - PRODUCTS

### 2.1 LUMBER, GENERAL

- A. Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: SPIB - Southern Pine Inspection Bureau.
- C. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
  - 1. Provide dressed lumber, S4S, unless otherwise indicated
  - 2. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.
  - 3. "Standard" grade.
  - 4. Southern Pine graded under SPIB rules.

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## 2.2 WOOD GROUNDS, NAILERS, AND BLOCKING

- A. Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. No. 2 Boards per SPIB rules.
- D. Wood grounds, nailers, and sleepers shall be pressure treated as specified herein.
- E. Wood blocking used in roof construction shall not be pressure treated.

## 2.3 PLYWOOD PANELS

- A. Construction Panel Standards: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood construction panels and, for products not manufactured under PS 1 provisions, with APA PRP-108.
- B. Trademark: Furnish construction panels that are each factory-marked with APA trademark evidencing compliance with grade requirements.
- C. Electrical or Telephone Equipment Backing Panels: DOC PS-1, Exposure 1 CD Plugged, fire retardant treated, Thickness: Minimum 15/32 inch. Paint per Division 15.

## 2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power Driven Fasteners: National Evaluation Report NER-272.
- D. Wood Screws: ANSI B18.6.1.
- E. Lag Bolts: ANSI B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.
- G. All fasteners used in pressure treated wood shall be stainless steel.

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## 2.5 MISCELLANEOUS MATERIALS

- A. Water Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propenyl butyl carbonate (IPBC) as its active ingredient.

## 2.6 PRESSURE TREATMENT OF WOOD

- A. Preservative Treatment
  - 1. ACQ - Ammoniacal copper quarternary compound: Pressure-injected
  - 2. Use 0.25 lb/cu ft retention
  - 3. Kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood
  - 4. Optional Preservative Treatment: CDDC: Copper hydroxide sodium dimethyldithiocarbamate
- B. Fire Retardant Treatment (for plywood backing panels only): AWPA C27 Type A
- C. Products: Basis of Design for pressure treatment is the following products by Chemical Specialties, Inc., Charlotte, North Carolina.
  - 1. Preservative Treatment: Preserve Plus
  - 2. Fire Retardant Treatment: D-Blaze
- D. Other acceptable products:
  - 1. NatureWood by Osmose, Inc., Griffin, Georgia

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Coordinate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

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- E. Use screws, unless otherwise indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.
- F. Use IPBC treated products at interior locations and ACO or CDDC treated products at exterior locations.

## 3.2 WOOD GROUNDS, NAILERS, AND BLOCKING

- A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Install permanent grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.
- D. All fasteners used in pressure treated wood shall be stainless steel.

## 3.3 INSTALLATION OF CONSTRUCTION PANELS

- A. Comply with applicable recommendations contained in Form No. E30, "APA Design/Construction Guide - Residential & Commercial," for types of construction panels and applications indicated.
- B. Fastening: Plywood Backing Panels: Nail, bolt, or screw to supports.

END OF SECTION 06 10 00

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SECTION 06 20 00  
FINISH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. The extent of each type of finish carpentry is shown on the Drawings and as specified herein.
- B. Items Provided and Installed:
  - 1. Western red cedar
  - 2. Custom exterior display cases
  - 3. Exterior aluminum grating (architectural) and insect screen.
  - 4. Counter tops and supports.
  - 5. Plastic laminate.
  - 6. Solid surfacing material.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product data for each type of factory-fabricated product and process specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for installation of finish carpentry by a firm that can demonstrate successful experience in installing finish carpentry items similar in type and quality to those required for this Project.
- B. Quality Standards: Except as otherwise shown or specified, comply with specified provisions of the Architectural Woodwork Institute (AWI) "Quality Standards."
- C. Measurements: Before proceeding with woodwork required to be fitted to other construction, obtain measurements and verify dimensions and any shop drawing details as required for accurate fit.
- D. Optimum Moisture Content: Kiln-dry woodwork to an average moisture content within the following ranges or as otherwise recommended by applicable Quality Standards for the regional climatic conditions involved.
  - 1. Exterior woodwork - 9 to 12 percent.
  - 2. Interior woodwork - 6 to 11 percent.

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## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels. Provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
- B. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified for installation areas.

## 1.5 PROJECT CONDITIONS

- A. Environmental Conditions: Obtain and comply with finish carpentry manufacturer's and installer's coordinated advice for optimum temperature and humidity conditions for finish carpentry during its storage and installation.
- B. Weather Conditions: Proceed with finish carpentry only when existing and forecasted weather conditions will permit exterior finish carpentry to be installed in compliance with manufacturer's recommendations and when substrate is completely dry.
- C. Examination of Substrate and Conditions: The installer must examine the substrate and the conditions under which this Section is to be performed and notify the Contractor in writing of any unsatisfactory conditions. Do not proceed with Work under this Section until unsatisfactory conditions have been corrected.
- D. Do not install woodwork until the required temperature and relative humidity have been stabilized in installation areas.
- E. Maintain temperature and relative humidity as required for a tolerance of plus or minus one percent of the specified optimum moisture content until woodwork receives specified finishes. Maintain temperature and humidity conditions until acceptance of the Work by the Owner.
- F. Protect installed woodwork from damage by other trades until Owner's acceptance of the Work. Advise Contractor of required protection procedures.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Western Red Cedar: WCLIB OR WWPA

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- a. Grade: Premium Grade, 1 and 2 Clear VG (Vertical Grain).
- b. Refer to the drawings and details for western red cedar slats and configurations.
- c. Fasteners: All fasteners shall be stainless steel.
- d. Provide all items and accessories as required for a complete installation in every respect.

## B. Custom Exterior Display Cases

- a. Custom aluminum framed.
- b. Refer to the drawings for details.
- c. Fasteners: All fasteners shall be stainless steel.
- d. Provide all items and accessories as required for a complete installation in every respect.

## C. Exterior Aluminum Grating and Insect Screen

- a. "Aluminum Dove Tail 19-ADT-4 as manufactured by Ohio Gratings; or Architect approved equal.
- b. Insect screen shall be dark gray fiberglass attached to the backside of the architectural grating. Refer to the drawings for details.
- c. Fasteners: All fasteners shall be stainless steel.
- d. Provide all items and accessories as required for a complete installation in every respect.

## 2.2 MISCELLANEOUS MATERIALS

A. Sealants: Comply with requirements of Division 7 Section "Joint Sealants" for materials required for sealing siding work.

### B. High Pressure Plastic Laminate:

1. Plastic laminate except backing or balancing sheets shall be high pressure laminate conforming to NEMA LD-1985.
2. Shall be Wilsonart "Design Group I" series or Architect approved equivalent; colors shall be selected by the Architect from the full line of standard colors.
3. Exposed Horizontal Surfaces: Shall be nominal .050 inch thick minimum with textured finish and conforming to NEMA standards for GP50 horizontal grade.
4. Exposed and Semi-Exposed, Interior and Exterior Vertical Surfaces: Shall be .028 inch thick minimum with low lustre textured finish and conforming to NEMA standards for GP28 vertical grade.
5. Backing Sheet for Concealed Surfaces: Shall be .030 or .020 inches thick, conforming to NEMA standards for GP28 vertical grade or CL20 cabinet liner.
6. Backing Sheet for Semi-Exposed Surfaces: Shall be .028 inches thick, conforming to NEMA standards for GP28 vertical grade. Use to balance face of laminate.

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## 2.3 FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry in relation to relative humidity conditions existing during time of fabrication and in installation areas. Provide finish carpentry with moisture content that is compatible with Project requirements.
- B. Fabricate finish carpentry to dimensions, profiles and details indicated. Ease edges to radius indicated for the following:
  - 1. Lumber less than 1 inch in nominal thickness: 1/16 inch.
  - 2. Lumber 1 inch or more in nominal thickness: 1/8 inch.

## 2.4 COUNTER TOPS AND SUPPORTS

- A. 3/4" marine grade plywood.
- B. Plastic laminate on all exposed surfaces.
- C. Provide all items and accessories as required for a complete installation in every respect.

## 2.5 SOLID SURFACING MATERIAL

- A. Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 & 6, Type Six, and Fed. Spec. WW-P-541E/GEN.
  - 1. Material shall have minimum physical and performance properties specified.
  - 2. Superficial damage to a depth of 0.010" shall be repairable by sanding and polishing.
- B. Performance Properties: Comply with the provisions of the latest editions for the following codes, specifications, and standards.
  - 1. Tensile Strength.....6000 psi per ASTM D 638
  - 2. Flexural Strength.....7890 psi per ASTM D 790
  - 3. Elongation.....0.4% per ASTM D 638
  - 4. Wear and Cleanability.....passes ANSI Z 124.3
  - 5. Stain Resistance.....passes ANSI Z124.3
- C. Accessories
  - 1. Joint adhesive shall be manufacturer's standard, two-part adhesive.
  - 2. Panel adhesive shall be manufacturer's standard neoprene based panel adhesive meeting ANSI A 136.1 UL listed.
  - 3. Sealant shall be mildew resistant silicone.
- D. Manufacturer: "Corian" as manufactured by DuPont; or Architect approved equal.

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation for a minimum of 24 hours unless longer conditioning recommended by manufacturer.
- C. Backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section "Painting."

### 3.3 INSTALLATION, GENERAL

- A. Do not use finish carpentry materials that are unsound, warped, bowed, twisted, improperly treated or finished, not adequately seasoned, or too small to fabricate with proper jointing arrangements.
  - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.
  - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 2. Install to tolerance of 1/8 inch in 8 feet for plumb and level. Install adjoining finish carpentry with 1/16 inch maximum offset for flush installation and 1/8 inch maximum offset for reveal installation.
  - 3. Coordinate finish carpentry with materials and systems that may be in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.
- C. Finish in accordance with specified requirements.
- D. Refer to Section 09 91 00 for final finishing of finish carpentry.
- E. Install all items in strict accordance with the manufacturers written installation instructions.
- F. Use IPBC treated products at interior locations and ACO or CDDC treated products at exterior locations.

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## 3.4 ADJUSTING

- A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

## 3.5 CLEANING

- A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

## 3.6 PROTECTION

- A. Provide final protection and maintain conditions that ensure finish carpentry is without damage or deterioration at time of Substantial Completion.

END OF SECTION 06 20 00

**Division 07**  
Thermal and Moisture Protection



# Downtown Bradenton Transit Station

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SECTION 07 11 00  
DAMPPROOFING

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Dampproofing:

1. Dampproof coating on exterior side of building perimeter CMU foundation walls to stop moisture penetration through surfaces.

### 1.2 SUBMITTALS

#### A. Submit in accordance with Division 01 requirements.

#### B. Product Data: Include data substantiating that materials comply with specified requirements for dampproofing material specified.

### 1.3 QUALITY ASSURANCE

#### A. Installer Qualifications: Engage an experienced installer who has completed bituminous dampproofing work similar in material, design, and extent to that indicated for Project and that has resulted in construction with a record of successful in-service performance.

#### B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### 1.4 PROJECT CONDITIONS

#### A. Substrate: Proceed with dampproofing work only after substrate construction and penetrating work have been completed. Starting of work means acceptance of substrate.

#### B. Weather: Proceed with dampproofing work only when existing and forecast weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

#### C. Ventilation: Provide adequate ventilation during application of solvent-based components in enclosed spaces. Maintain ventilation until dampproofing membrane has thoroughly cured.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Material for dampproof coating shall be fibered bituminous material of a consistency suitable for application by troweling or spraying.
  - 1. Basis of Design: "Hydrocide 700B," manufactured by Sonneborn Building Products, ChemRex, Inc., Shakopee, Minnesota. [www.chemrex.com/sonneborn](http://www.chemrex.com/sonneborn)
  - 2. "Tex-Mastic 714," manufactured by J & P Petroleum Products, Inc., Lewisville Arkansas.
  - 3. "Marine Mastic," manufactured by Toch Brothers, Inc., St. Louis, Missouri.
  - 4. "AW-60" manufactured by Tamko, Joplin, Missouri. [www.tamko.com](http://www.tamko.com)
  - 5. "Sealmastic" manufactured by W.R. Meadows, Inc., Elgin, Illinois. [www.wrmeadows.com](http://www.wrmeadows.com)
- B. Rigid protective boards shall be 1/8 inch thick "Protection Course II" material by Sonneborn; or equal.
  - 1. Protection boards shall be used if rigid perimeter insulation is not protecting.

### 2.2 MATERIALS

- A. Waterborne, emulsified-asphalt dampproofing compound.
- B. Comply with ASTM D1187 and ASTM D1227.
- C. 50% solids by volume, minimum.
- D. Fibrated.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF SUBSTRATE

- A. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer.
- B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.
- C. Fill voids, seal joints, and apply bond breakers (if any) as recommended by prime materials manufacturer, with particular attention at construction joints.
- D. Install separate flashings and corner protection stripping as recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and manufacturer's recommendations. Give particular attention to requirements at building expansion joints, if any.

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- E. Prime substrate as recommended by prime materials manufacturer.
- F. Protection of Other Work: Do not allow liquid and mastic compounds to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work, by masking or otherwise protecting adjoining work.
- G. Before applying dampproofing, fill cracks, holes, voids, and open areas in surfaces. Surfaces shall be dry and free of dirt, grease, excess mortar, or other foreign matter that might interfere with adhesion and penetration of the coating. Surface shall be dry and free of dust or loose particles.

## 3.2 INSTALLATION

- A. Comply with manufacturer's recommendations for trowelled application, except where more stringent requirements are indicated or specified and where project conditions require extra precautions or provisions to ensure satisfactory performance of work.
- B. Install in strict accordance with the manufacturers written installation instructions.
- C. Provide all items and accessories as required for a complete installation in every respect.

## 3.3 APPLICATION

- A. Apply coating material in accordance with the manufacturer's printed instructions using sufficient quantity to form a continuous unbroken coating over surfaces to be dampproofed. Retouch surfaces as necessary to provide a continuous coating. Protect adjacent surfaces from damage by the dampproofing. Material applied with trowel or by spray, shall have at least 1/8 inch thickness.
  - 1. Application by spray method shall be applied with a minimum of 3 coats to achieve the 1/8" consistent thickness.
- B. Apply mastic in one coat directly from the container without thinning. Form a cove at the corner junction of surfaces which are coated. Joints, grooves, slots, or breaks in the surface shall be completely and continuously covered. Spread coating into chases, corners, reveals, soffits, or other surfaces which occur below grade. Reinforce at corners and angles with one additional thickness of membrane.

## 3.4 PROTECTION

- A. After the mastic has set, cover dampproofing mastic with a protective board course. As soon as solvents have left the mixture, apply one board layer over the entire surface of the mastic, holding in place with spots of additional mastic.

## 3.5 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

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- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

END OF SECTION 07 11 00

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SECTION 07 19 10  
ANTI-GRAFFITI TREATMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide and install anti-graffiti treatment on exterior exposed CMU, concrete, painted steel and wood.

### 1.2 SUBMITTALS

- A. Submit manufacturers complete product data in accordance with Division 1 requirements.

### 1.3 QUALITY ASSURANCE

- A. Comply with manufacturers written environmental and safety precautions during application.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Anti-graffiti treatment shall be "Anti-Graffiti Coating #AG2" as manufactured by Hy-Tech, Melbourne, Florida
- B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval and complete technical data for evaluation must be received at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

### 2.2 MATERIALS

#### PHYSICAL PROPERTIES:

- \* Physical State: Color Milky - Dries Clear
- \* Gloss: Slight Sheen
- \* Solids: By Volume: 34.53% By Weight: 35.16%
- \* Coating VOC: 0.40 Lb/Gal (48 Grams/Liter)
- \* Flash Point: Non Flammable
- \* Theoretical Coverage: 100-300 sq.ft./gal depending on porosity of substrate (2 coats required)

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## PART 3 - EXECUTION

### 3.1 SURFACE PREPARATION

- A. In accordance with the manufacturers written instructions.

### 3.2 INSTALLATION

- A. Install all materials in strict accordance with manufacturers written installation instructions at application rates as recommended by the manufacturer.

END OF SECTION 07 19 10

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SECTION 07 21 00  
BUILDING INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following types of insulation:

1. Miscellaneous stuffing insulation.
2. Unfaced batt insulation.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Submit complete product data for each material proposed to be provided.
- C. Submit complete manufacturers installation instructions for each type of insulation as specified.
- D. Submit manufacturer's certificate certifying that insulation meets or exceeds specified requirements.
- E. Invoices and other documentation from manufacturer of the amount of post-consumer and post-industrial recycled content by weight for insulation products.

### 1.3 QUALITY ASSURANCE

A. Insulation shall be legibly marked with the following data:

1. Its "R" value per inch and the mean test temperature
2. The manufacturer's name
3. The insulation type and its trade name
4. Water vapor transmission (perm inch average)
5. UL rating - flame spread, fuel contribution, smoke developed (ASTM E84 and D1692)

B. The "R" values indicated are for the insulation tested at 75 degrees F mean temperature. It shall be for the total thickness of the insulation and shall exclude surface resistance. Manufacturers shall certify that their insulation complies with these requirements.

C. Insulation delivered to the job without this identification or being less efficient than the insulation specified will be rejected.

D. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.

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2. Combustion Characteristics: ASTM E 136.
- E. Toxicity/Hazardous Materials
1. Formaldehyde: Products containing urea-formaldehyde will not be permitted
  2. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted
- 1.4 DELIVERY, STORAGE AND HANDLING
- A. Protect insulation materials from physical damage and from deterioration by 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.
- B. Protect 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 plastic insulating materials to Project site before installation time.
  3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.1 MISCELLANEOUS STUFFING INSULATION

- A. Shall be inorganic (nonasbestos) mineral wool insulation without facing, for the purpose of filling and stuffing openings in walls around pipes, structural components, conduits, expansion joints to eliminate noise transfer and to insulate. Use to seal top of interior walls, not fire rated walls, between masonry and roof deck, or as otherwise indicated. Use at expansion joints as detailed or as otherwise indicated. Insulation shall have a flame spread rating of 15 or less, and a smoke development rating of 0; per ASTM E 84. Approved manufacturers are as follows:
1. "Industrial Bulk Wool" packing wool fibers by Thermafiber Corporation, Wabash, Indiana; [www.thermafiber.com/](http://www.thermafiber.com/)
  2. Rock Wool Manufacturing Company, Leeds, Alabama; [www.deltarockwool.com/](http://www.deltarockwool.com/)

### 2.2 UNFACED BATT INSULATION

- A. Unfaced preformed formaldehyde-free glass fiber batt insulation conforming to ASTM C665, Type III, Class B, Category 1. Approved manufacturer are as follows:
1. JohnsManville, Denver, Colorado; <http://www.jm.com/>
  2. Other manufacturers are acceptable provided they can provide a formaldehyde-free glass fiber batt insulation. Submit request for product approval at least 10 days prior to bid due date to the Architect.

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## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare surfaces and areas to receive insulation material as required by the manufacturer. Do not install materials in unsatisfactory areas or to improperly prepared surfaces.

### 3.2 GENERAL INSTALLATION

- A. Coordinate application of insulation with the appropriate building trades involved.
- B. The installer doing the insulation work shall furnish adhesives or attaching means, if required, so that insulation material will be properly held in alignment and permanently attached to the surfaces which they are to be applied without damaging surface.
- C. 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.
- D. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- E. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- F. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- G. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- H. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

### 3.3 MINERAL WOOL INSULATION

- A. Where the Drawings call for interior walls to extend to deck or roof, openings in walls between rooms above the ceiling shall be sealed with mineral wool placed or stuffed in openings to eliminate noise transfer and air movement. Mineral wool insulation shall be provided at other building locations indicated or requiring minor fill to eliminate air movement.

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## 3.4 BATT INSULATIONS

- A. Install in areas as indicated. Install in strict accordance with the manufacturers written installation instructions. Install in all exterior wall voids, behind beams, and concealed locations in the exterior walls and roof areas of the building whether or not indicated. All gaps shall be filled with batt insulation.
- B. Install thermal insulation as follows:
  - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
  - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
  - 4. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch (16-gage)-diameter tie wire and inserted through slot in web of member.
- C. All voids in the perimeter of the building shell shall be filled and closed with batt insulation or miscellaneous mineral wool stuffing insulation, whether or not indicated or shown. This includes behind all steel beams, wide flange beams, channels, CMU, miscellaneous framing, etc.

## 3.5 CLEAN UP

- A. Clean up all wrappings, scrap, and cut material waste at the end of each day's work. Refer to Section 01 74 13 for additional requirements.

## 3.6 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

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- E. Recheck measurements and dimensions, before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

## 3.7 PROTECTION

- A. Protect installed insulation 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 07 21 00

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SECTION 07 21 10  
FOAMED-IN-PLACE INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Work required to provide and install foamed-in-place insulation in exterior CMU walls as specified herein and as shown on Drawings.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Submit manufacturer's technical data indicating all physical and chemical specifications of products.

### 1.3 QUALITY ASSURANCE

- A. Installation shall be by an approved, certified contractor recommended by the manufacturer. Submit proof of certification with shop drawing submittals.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: "Tripolymer PRMIU" as manufactured by C.P. Chemical Co., Inc., White Plains, New York; [www.tripolymer.com](http://www.tripolymer.com).
- B. Other Acceptable Product: Provided of the following manufacturers are acceptable provided compliance with technical requirements as specified:
  - 1. "Core-Fill-500™," Tailored Chemical Products, Inc., Hickory, North Carolina; <http://www.core-fill500.com>.

### 2.2 MATERIAL

- A. Foamed-in-place insulation shall consist of two components, resin and catalyst with the following physical properties and complying with the provisions of the latest editions of the following codes, specifications, and standards:
  - 1. Density (ASTM D 1622): 0.8 - 1.3 lbs. per ft.<sup>3</sup>
  - 2. Compressive Strength (ASTM D 1621) – Proctor A Test Method): 35 psi
  - 3. Fire Characteristics (ASTM E 84):
    - a. Flame Spread : 5
    - b. Smoke Developed: 0
    - c. Fuel Contributed: 0

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4. Water Vapor Transmission (ASTM C 355): 15.5 - 16.9 perms per inch
5. Non-toxic per FHSA.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Installation shall be by a certified insulation applicator.
- B. Work shall be in strict accordance with manufacturer's written installation instructions.
  1. Install product at rate and in amounts as recommended by manufacturer to completely fill cavities shown on Drawings to receive foamed-in-place insulation.
- C. All equipment used in the installation shall be certified by insulation manufacturer.
- D. Provide all items and accessories as required for a complete installation in every respect.

END OF SECTION 07 21 10

# Downtown Bradenton Transit Station

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SECTION 07 22 00  
ROOF AND DECK INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of HCFC FREE roof insulation for roofing of new building, as indicated on the Drawings and specified herein.
- B. Related Work Specified Elsewhere
  - 1. Fully Adhered PVC Sheet Roofing, Section 07 54 00.
  - 2. Flashing and sheet metal, Section 07 60 00.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 1 requirements.
- B. Submit complete manufacturer prepared Shop Drawings for roof insulation and for roof saddle system.
- C. Submit complete product data for parallel roof insulation boards and fasteners.
- D. Submit warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. Indicated and specified "R" values are aged "R" values at 75 degrees in accordance with RIC/TIMA Technical Bulletin 281-1.
- B. All roof insulation products shall be CFC free.
- C. Roof system shall be designed to meet wind-loading requirements for 2007 Florida Building Code with the 2009 Supplement. Refer to Structural Drawings for wind velocity
- D. The insulation is to meet the physical properties of ASTM C 1289, latest edition, Type II; Class 1, Grade 3. The insulation shall provide a minimum Long Term Thermal Resistance (LTTR) value of 5.6 per inch @ 75 degrees F. 5.6 per inch shall be the basis for establishing thickness in inches required. The use of aged R-values based on the RIC-TIMA conditioning procedure 281-1 is not acceptable.

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## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original packaging, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect from direct exposure to sunlight.
- D. Do not install insulation which has become wet or damaged.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Products of the following manufacturers will be considered for polyisocyanurate roof insulation providing they can furnish products equal to those specified and are approved by the membrane manufacturer, and does not restrict the terms of the roofing warranty.
  - 1. Celotex, Tampa, Florida; [www.celotex.com](http://www.celotex.com)
  - 2. Dyplast Products, Miami, Florida; [www.dyplastproducts.com](http://www.dyplastproducts.com).
  - 2. Hunter Panels, Chicago, Illinois; <http://www.hpanels.com/>
  - 3. Johns Manville, Denver, Colorado; [www.johnsmanville.com](http://www.johnsmanville.com)
  - 4. Rmax, Inc., Dallas, Texas; [www.rmaxinc.com](http://www.rmaxinc.com)
- B. Parallel and Tapered Roof Insulation: Insulation shall have glass fiber reinforced facer sheets on both sides integrally laminated to the polyisocyanurate core material. Insulation shall meet FM Class 1 construction. Type II, Class 2, Grade 3 per ASTM C1289, latest edition.
  - 1. Total LTTR value shall be minimum 20, unless otherwise indicated.
  - 2. Achieve LTTR by a minimum assembly of two layers totaling 4-inches in thickness. Use additional layers depending on board thickness
  - 3. Cover Board: ½ inch thick Dens-Deck as manufactured by Georgia-Pacific.
  - 4. Compressive Strength: 25 pounds per square inch minimum. Grade 3 per ASTM C1289, latest edition.
  - 5. Dimensional Stability: 2% maximum linear change when conditioned at 158 degrees F and 97% relative humidity for seven days.
  - 6. Curing Time: 24 hours minimum, plus an additional 24 hours minimum per inch of thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
  - 7. Board Thickness: 2 inches maximum.
  - 8. Board Size: 4 x 8 ft. maximum board size for loose-laid and mechanically attached insulation boards; 4 x 4 ft. maximum board size for fully adhered insulation boards.
- C. Roof Saddle System: Saddles shall be glass fiber reinforced facer sheets on both sides integrally laminated to the polyisocyanurate core material.

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- D. Cants and Edge Strips: Pressure treated wood as specified in Section 06 10 00.
- E. Fasteners: Metal fasteners and the insulation shall be approved by the membrane manufacturer to assure that required conditions are met to provide a membrane manufacturer's roof warranty. The type of fastener shall be appropriate for the substrate to achieve maximum withdraw and anti-corrosion characteristics. The membrane manufacturer approved fasteners shall also meet the following requirements:
  - 1. FM 4470 SPRI Corrosion Test Procedure for Roofing Fasteners. To pass, the fasteners shall not accumulate more than 15 percent red rust after the "required number cycles" in the Kesternich cabinet.
    - a. The required number of cycles is as currently recommended by FM and SPRI, but in no case shall it be less than 15.
- F. Adhesives: Shall conform to manufacturer's recommendations and complying with requirements of Section 07 92 00, Sealants and Caulking.

## 2.2 COMPATIBILITY OF PRODUCTS

- A. It shall be this Contractor's responsibility to verify the compatibility of products specified in this Section with products specified in other Sections. Substitution of components that would restrict or limit the Roof Guarantee will not be accepted.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with insulation manufacturer's instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.
- B. Roof Insulation - General: Lay in multiple courses. Edges shall be butted to provide moderate contact but not deformed or placed in surface compression. Neatly cut and fit insulation around projections and vertical surfaces. Edges shall be mitered at ridges and elsewhere to prevent open joints or irregular surfaces. Stagger end joints in adjoining courses of base course. Stagger joints in succeeding layers with joints of layer below.
  - 1. Insulation shall be installed in multiple courses with staggered joints in both directions.
- C. Provide all items and accessories as required for a complete installation in every respect.

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## 3.2 COORDINATION

- A. Installation of insulation shall be coordinated with other relative work preceding and subsequent to actual installation of insulation. This includes, but is not necessarily limited to, the following:
1. Installation of nailers, backing, and insulation strips.
  2. Installation of roof curbs.
  3. Installation of flashings.

END OF SECTION 07 22 00

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SECTION 07 26 10  
UNDERSLAB VAPOR RETARDER

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide the Work required to provide and install the underslab vapor retarder and its accessories as indicated on the Drawings and as specified herein.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product data and general recommendations from materials manufacturer for types of underslab vapor retarder required.
- C. Samples of underslab vapor retarder and auxiliary materials.
- D. Submit pre-installation conference meeting minutes.

### 1.3 QUALITY ASSURANCE

- A. Pre-installation Conference: Prior to installing vapor retarder and associated work, meet at Project site with the contractor. Review material selections and procedures to be followed in performing work. Notify Architect at least 48 hours before conducting meeting.
- B. Definition: Vapor Retarder: A material or assembly of materials that resists water vapor transmission through it.
- C. Vapor Retarder shall comply with:
  - 1. ASTM E 1745, latest edition, "Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs."
  - 2. ASTM E 1643, latest edition, "Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs."
  - 3. Federal Specification UU-B-790a Type 1, Grade A, Style 4.

### 1.4 PROJECT CONDITIONS

- A. Substrate: Proceed with work after substrate construction, openings, and penetrating work have been completed and areas are free of standing or running water, ice, and frost.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: "Moistop Ultra 10" as manufactured by Fortifiber Building Products Systems, Fernley, Nevada; [www.fortifiber.com](http://www.fortifiber.com). Products of the following manufacturers are also acceptable provided compliance with requirements as specified herein:
1. Griffolyn Division of Reef Industries, Inc., Houston, Texas; [www.reefindustries.com/griff/griff.php](http://www.reefindustries.com/griff/griff.php)
  2. Stego Industries, LLC, San Juan Capistrano, CA; [www.stegoindustries.com](http://www.stegoindustries.com)

### 2.2 UNDERSLAB VAPOR RETARDER

- A. Multi-layer composite polyethylene reinforced with fiberglass reinforcing.
- B. Class C material in accordance with ASTM E 1745, latest edition.
- C. Water Vapor Permeance: 0.3 perms.
- D. Tensile Strength: 13.6 lbf/in.
- E. Puncture Resistance: 475 grams.
- F. Thickness: 10 mil reinforced.

### 2.3 AUXILIARY MATERIALS

- A. Joint Tape: Provide types of adhesive compound and tapes recommended by underslab vapor retarder manufacturer for seams in vapor retarder, and for projections through vapor retarder.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Ensure that all items that pass through the vapor retarder are properly and rigidly installed.
- B. Substrate shall be free of projections and irregularities.

### 3.2 INSTALLATION

- A. Comply with manufacturer's instructions for handling and installing underslab vapor retarder materials.

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- B. Seal projections through vapor retarder and seal seams. Bond to vertical surfaces and also, where shown or recommended by manufacturer, bond to horizontal surfaces.
- C. Overlap and seal all seams in strict accordance with the manufacturers written installation instructions.

## 3.3 PROTECTION

- A. Protect completed vapor retarder during installation of the concrete slab on grade.
- B. Repair and seal all punctures that may occur prior or during installation.
- C. Vapor retarder shall be continuously sealed at all joints and projections.

END OF SECTION 07 26 10

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# Downtown Bradenton Transit Station

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SECTION 07 41 13  
PREFORMED METAL ROOFING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Preformed metal roofing and related Work as specified herein, and as required for a complete installation. Work under this Section includes, but is not limited to:
  - 1. Metal roofing and fascia.
  - 2. Flashing, closures, and cap trim.
  - 3. Metal gutters and downspouts.
  - 4. Clips, accessories, and fasteners.
  - 5. Sealants for components under this Section.

### 1.2 SUBMITTALS

- A. Shop Drawings: Show profile and gage of items, location and type of fasteners; location, gage, shape, and method of attachment of trim; and other details as may be required for a weathertight installation.
  - 1. Do not proceed with manufacture prior to review of shop drawings. Do not use Drawings prepared by Architect for shop or erection drawings.
  - 2. Shop drawings shall show methods of erection, elevations, and plans of roof panels, sections, and details, anticipated loads, flashings, roof curbs, vents, sealants, interfaces with materials not supplied, and proposed identification of components parts and their finishes.
  - 3. Shop Drawings shall bear the seal and signature of Structural Engineer registered in the State of Florida.
  - 4. Calculations for wind load design shall be stamped, sealed and signed by a Professional Engineer in the State of Florida verifying compliance with ASCE/SEI 7-02.
  - 5. Submit laboratory test report showing roof assembly compliance with SSTD 12-99.
  - 6. Submit copy of current Florida Product Approval 2007 Version with 2009 changes
  - 7. Submit Miami-Dade NOA which documents ability to handle the highest negative loads on this roof by a test result.
- B. Submit 3 copies of appropriate color selection materials.
- C. Submit pre-roofing conference meeting minutes.
- D. Submit warranties as specified herein.

### 1.3 QUALITY ASSURANCE

- A. Applicable standards:
  - 1. AISC: "Steel Construction Manual," American Institute of Steel Construction.
  - 2. AISI: "Cold Form Steel Design Manual," American Iron and Steel Institute.

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3. ASTM A792-AZ55: Specifications for steel sheet, aluminum-zinc alloy coated (galvanized) by the hot dip process, general requirements (galvalume).
  4. ASTM E283-84: "Air Infiltration Test."
  5. ASTM E331-83: "Water Penetration Test."
  6. ASTM A653: Specifications for steel sheet, hot dipped galvanized steel, coated aluminum-zinc alloy, coated steel-hot dipped aluminum zinc alloy or painted galvanized with exterior color specified by manufacturer.
  7. ASTM –PA 114- G full submersion test
  8. Clip Cycle test 100,000 cycles with 10 lbs. load on clip, with result of no wear on the panel
- B. Manufacturer's qualifications: Minimum of 10 years experience in manufacturing panels of this nature, in a permanent, stationary, indoor production facility
- C. The installer shall have been actively installing the type of roofing system defined in these Specifications for a minimum of 5 years and be approved by the manufacturer of the system being installed.
- D. Design: The preformed metal roof system shall be designed to sustain the specified loads in accordance with governing building codes in the county and state that this Project is located in. Components of the preformed metal roof system shall meet the design loads and applied in load combinations as specified in governing building codes, without exceeding the allowable working stresses.
1. Roof system shall be designed to meet wind-loading requirements for the 2007 Florida Building Code with the 2009 Supplement. Refer to Structural Drawings for wind velocity and design pressures.
- E. When tested in accordance with ASTM E1680 and ASTM E1646, the panel assembly shall show no more than 0.01 cfm/ft<sup>2</sup> of air infiltration at 6.24 psf test pressure and no water leakage at 15 psf test pressure for 15 minutes with a volume spray of 5 gallons per hour.
- F. Structural: Uniform load capacity shall be determined by testing in accord with the principles of ASTM E1592 adapted to testing of formed sheet panels by clarifying specific sections of this standard as follows:
1. Roof test specimens shall be representative of the main body of the roof, free from influence of perimeter conditions. The setup shall be continuous over one or more supports and contain at least 5 panel widths.
  2. No roof attachments are permitted at the sides other than the standard gable or rake condition. For uplift tests, at least one end seal shall be flexible and in no way restrain the crosswise distortion of panels. One end may simulate an eave condition if at least 12 feet away from the mid-roof clip under evaluation.
  3. Roofing panels and accessories shall be production material of the same type and thickness proposed for use on the project.
  4. Longitudinal seals or plastic film shall not span any crevice or cracks that may tend to separate under pressure (e.g. plastic films used to seal the chamber must be applied into the side seam of the panel so as to apply a uniform static pressure to the entire cross section of the panel).

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- G. Weathertightness: When tested in accord with the principles of AAMA 5.01 and TAS 100-95 Wind Driven Rain test the roof system without sealant in the ribs shall show no leakage when exposed to dynamic rain and wind velocity up to 70 mph for 5 minutes.
- H. Thermal Cycle Test: An assembly consisting of clips, 3 or more panels in width, and spanning 3 or more supports with clips positively loaded to 10 pounds shall resist 100,000 thermal cycles and show no visible signs of wear from the exterior and erode no more than 25 percent of the panel of clip material from the underside (non-exposed surfaces).
- I. The roofing manufacturer's representative shall inspect the roof within one year after the Date of Substantial Completion.
  - a. Manufacturer technical staff personnel shall perform a roof installation start up session, and perform a minimum of three inspections during the installation progress , and file a report detailing progress and any deficiencies , A final inspections with a full report to the architects and approving the issuance of the warranty as described in this specification.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver panels to job site properly packaged to provide against transportation damage.
- B. Handling: Exercise extreme care in unloading, storing, and erecting panels to prevent banding, warping, twisting, and surface damage.
- C. Storage: Store materials and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up between panels.

## 1.5 JOB CONDITIONS

- A. Pre-Roofing Conference
  - 1. Prior to the installation of the roofing and associated work, meet at the project site with the installer, the installer of each component of associated work, the installers of deck or substrate construction to receive roofing work, the installers of other work in and around roofing that must follow the roofing work (including Mechanical Work), the Architect, and other representatives directly concerned with performance of the work, including (where applicable) insurers, test agencies, product manufacturers, governing authorities, and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements (or disagreements) reached and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to the roofing work including, but not necessarily limited to, the following:
    - a. Review project requirements (Drawings, Specifications, and other Contract Documents).
    - b. Review required submittals, both completed and yet to be completed.

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- c. Review status of substrate work (not by the Metal Roofing Installer), including drying, structural loading limitations, and similar considerations.
- d. Review required inspection, testing, certifying, and accounting procedures.
- e. Review regulations concerning code compliance, environmental protection, health, safety, fire, and similar considerations.
- f. Consider each party's extant judgment, as advanced in the interest of successful completion of Work.

## 1.6 WARRANTY

- A. Installer's Material and Workmanship Warranty: The Contractor shall furnish to the Owner a written 5-year guarantee covering the roofing and flashing work including the installation of products furnished by others and installed under this Section of the Work against defects in materials and workmanship for indicated warranty period. Guarantees are not intended to serve as protection against poor workmanship or inferior or improper materials at the time the roof is installed, but are for the purpose of protecting the Owner against future failures during the intended life of the roof covering.
- B. The manufacturer for the preformed metal roofing shall also furnish to the Owner a written guarantee covering the finish of exposed coated metal surfaces against blistering, peeling, cracking, flaking, checking, chipping, rusting, and excessive chalking and color change for a period of 20 years.
  - 1. Also provide a manufacturer's 20 year weathertightness warranty equal to Industry Standard weathertightness warranty.
- C. Guarantee/warranty shall include, but not be limited to, preformed metal roofing, fascias, roof insulations, flashings, cap flashings, closures and trims, fasteners, accessories, sealants, gutters, and watertight connection to downspouts.
- D. Guarantee/warranty period shall begin on the Date of Substantial Completion for the Project or such date that the roof is accepted by the Architect and Owner.
- E. Repairs required, either permanent or temporary, to preformed metal roofing or roof flashings under this guarantee to keep the roof watertight shall be started within 3 days after notice of the need for repairs. Should the Contractor fail to make such repairs within a reasonable time period, the Owner may have such repairs made and charge the cost to the Contractor.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Preformed metal roofing will have a minimum 2.5 inches high vertical leg that is field crimped with two beads of sealant, top and bottom, in the crimp. The standing seam panels will be installed with a concealed fastening system. One piece seam, using a two piece sliding clip. No continuous or one piece clips allowed. Panels must be full length from eave to ridge. NO END LAP JOINTS ALLOWED.

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- B. Products of the following manufacturers will be considered, providing their products equal or exceed the quality specified; and they can provide products of the type, size, function, and arrangement required. Manufacturer shall verify project requirements with Structural Drawings for product listed below. If metal roof panel system cannot meet minimum project requirements, then metal roof system will not be acceptable.
1. Basis of Design: Series 300, Imetco, Tucker, Georgia
  2. SRS System, Centria Roof Systems, Moon Township, Pennsylvania
  3. BEMO 305, BEMO USA, Tampa, Florida
  4. Zip Rib, Merchant & Evans, Inc., Burlington, New Jersey
- C. Finish to be factory applied one mil thick full strength Kynar 500 fluorocarbon based coating over thoroughly cleaned and pretreated aluminum. Coating to be applied before fabrication of roofing components. Color: Preweathered galvalume. Full coating to be applied to bottom and top of each roofing panel.
- D. Metal sheets or coils selected for forming into panels must be cut to size before receipt of finish coating or have cut edges specially coated with similar film of same applied finish after being sized. Actual finish and coating method intended for provision must appear on submitted shop drawings.

## 2.2 DESIGN OF SYSTEM

- A. Panel shall be designed in accordance with sound engineering methods and practices and in accordance with the latest edition of AISI's "Specification for the Design of Cold Formed Steel Structural Members."
- B. Roof structure shall be designed with proper recognition for the "floating system" which must exist to have a roof panel that meets expansion and contraction requirements. Provide layout of fixed points and allowance for expansion on continuous length panels signed and sealed by an engineer with seal.
- C. Panel shall be designed so that damaged panels may be replaced without interfering with adjacent panels. Replacement shall not require the use of through the roof fasteners.

## 2.3 MATERIALS

- A. Panels shall be fabricated in full lengths from ridge to eave without end laps. Panels shall be 16 inches wide maximum with concealed anchors that resist wind uplift yet permit expansion and contraction with temperature changes. Standing ribs 2.5 inches high minimum shall have a continuous groove capillary break. Ribs shall be securely locked over anchor clips with an electrically driven, field operated, roll forming tool. Individual panels shall be removable for replacement of damaged material. A minimum of two, 3/8-inch high intermediate stiffener ribs shall be located in the flat pan to minimize oil-canning and telegraphing of structural members, striated panels are also acceptable. Panels shall be 22 gauge galvanized steel.

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- B. Concealed clips shall be not less than 24 gauge galvanized coated, 50,000 psi minimum yield or nonmagnetic stainless steel. Clip design is to be such that it will accommodate expansion and contraction requirements while being anchored securely to structure.
- C. Concealed fasteners shall be self drilling, self tapping sheet metal screws of SAE #1022 steel with .0003 inch minimum zinc coating meeting Federal Specification QQ-Z325 Type II.

## 2.4 ROOF SYSTEM ACCESSORIES

- A. Gutter, Downspout, Trim, and Flashings
  - 1. Gutters and downspouts shall be furnished in 24 gauge galvanized pre-finished steel with Kynar 500 color finish on all exposed sides and edges, in color as selected by Architect. Unexposed sides and edges shall be standard baked-on finish. Form to configuration indicated. Provide aluminum gutter straps, color and finish to match gutter.
    - a. All downspouts shall be a minimum of 3/16" aluminum to 8 foot above finish grade.
    - b. All gutters shall be continuous between turns and bends. Joints at turns, bends and downspouts shall be welded/soldered.
    - c. Match profiles on the drawings.
    - d. Provide Flat PVC cap with opening cut to profile of downspout for connection to underground drainage system.
  - 2. Fascia, eave, and rakes shall be 24 gauge galvanized steel with Kynar 500 color finish on all exposed sides and edges in colors as selected by Architect. Color finish shall be air-dried Kynar 500 finish in custom color if required.
- B. Sealant: The standard of quality shall be that of a reputable and established sealant manufacturer, approved by the manufacturer of the metal building in which the sealant is used. Sealants shall have good cohesion as well as good adhesion to the protective coated metal and shall not be corrosive to components on which it is applied. Each shall have adequate handling characteristics during normal ranges of construction or erection temperatures. The sealant shall be one that will retain its weather sealing properties under the conditions for which it is used and each (sealant) is recommended for only the applications listed hereafter.
  - 1. Extrudable sealant, non-migratory, nondrying, and non-skinning synthetic elastomer base material conforming to the National Association of Architectural Metal Manufacturer's NAAMM Standard SS-1a-68, and except for the "tack free time", shall conform to the performance requirements of Federal Specification TTC-598-b Type 1. Use at the following locations:
    - a. Factory applied sealant in longitudinal ribs of standing seam roof panels.
    - b. Spot sealing laps (where applicable) of standing seam roof panels.
    - c. Sealing ridge cover and miscellaneous flashing.

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2. Extruded butyl material conforming to performance requirements of Military Specification #MIL-C-18969B Type II Class B. With the exception of the "compressor set" requirement, it shall also conform to the National Association of Architectural Metal Manufacturer's NAAMM Standard #SS-1b-68 Class A for nonskinning resilient preformed compounds. Size of tape shall be that recommended by the building manufacturer. Use at the following locations:

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Areas on which insulation and metal roofing is to be installed shall be completely secured and free of dirt and debris.
- B. Notify Architect in writing of defects in substrate that would be detrimental to metal roofing installation prior to start of Work.
- C. Start of insulation and metal roofing installation shall constitute acceptance of substrates by this Contractor.

### 3.2 METAL ROOFING INSTALLATION

- A. Erection of the preformed metal roofing system shall be performed in accordance with the manufacturer's erection drawings.
- B. Install in strict accordance with the manufacturers written installation instructions.
- C. Provide and install all items as required for a complete and watertight warranted installation in every respect.

### 3.3 GENERAL INSTALLATION PROVISIONS

- A. Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- B. Inspect materials immediately upon delivery and again prior to installation. Reject damaged and defective items.
- C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

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- E. Recheck measurements and dimensions, before starting each installation.

END OF SECTION 07 41 13

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SECTION 07 54 00  
FULLY ADHERED PVC SHEET ROOFING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of fully adhered PVC membrane roofing system indicated on the Drawings and specified herein.

### 1.2 SUBMITTALS

- A. Submit product data in accordance with Division 1 requirements, to substantiate that the products being installed are as specified. Product data shall be submitted so that it can be established that the roofing subcontractor has clear understanding as to what was specified.
- B. When warranties are delivered to the Owner, a cover letter shall be included directing the Owner to inform (copy) the manufacturer as well as the Roofing Contractor when reporting roofing problems, regardless of when they occurred during the warranty period.
- C. Contractor shall submit shop drawings for ordering, manufacturing, and final inspection of the Roofing System. Drawings shall include roof outline, roof dimensions, roof penetrations, insulation type and thickness, piece layout, parapet size and location, and other information which may affect the suitability and installation of the Roofing System on the respective project.
- D. Pre-roofing conference meeting minutes.
- E. Roof inspection and maintenance manual.
- F. Copies of each roof inspection as conducted by the manufacturer's representative.
- G. Submit warranties as specified.

### 1.3 QUALITY ASSURANCE

- A. Roofing Contractor shall obtain from the roofing manufacturer copies of each roof inspection and furnish a copy to the Architect. Contractor shall inform roofing manufacturer, with regard to warranties, that warranties shall be issued, based upon the acceptance of the roofing work, and that deficiencies noted on inspection reports have been corrected. Manufacturer shall not refuse or restrict the provisions of its warranty, based upon deficiencies noted on inspection reports, especially any report that may not have been furnished to Architect. Architect will not approve final payment of roofing work until final and interim inspection reports and warranty are in hand. Architect's representative shall accompany manufacturer's inspector and Roofing Installer during final inspection before issuing manufacturer's warranty.

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- B. Roofing firm (installer) and roofing membrane manufacturer shall have a least 10 years successful experience in the type of roofing system specified. Roofing contractor shall be approved and trained specifically by the membrane manufacturer in the installation of the fully adhered thermoplastic membrane roofing.
- C. Project Foreman/Supervisor: Roofing installer shall have on the job whenever roofing work is being done, a foreman/supervisor with a minimum 3 years experience in the type of roofing specified or the roofing manufacturer's technical field representative.
- D. Roofing and associated work shall be performed by a single firm called the "Installer" in this Section, so that there will be undivided responsibility for the specified performance of components parts including, but not limited to, the following (even though some parts may be subcontracted to others):
  - 1. Insulation and saddles, Section 07 22 00.
  - 2. Metal flashing and counterflashing in connection with roofing, Section 07 60 00.
  - 3. Provide wood insulation stops, wood nailers, and blocking required for installation of new roof and sheet metal in conformance with requirements of Section 06 10 00.
- E. Roofing Membrane Manufacturer must be a Partner in the United States Environmental Protection Agency Energy Star Roof Products Program. Roof Membrane Manufacturer and Product must be listed on the Energy Star Roof Products Program Compliant Product List.
- F. Roof membrane system shall be designed to meet wind-loading requirements for Florida Building Code 2007 with the 2009 Supplement and FEMA 361. Refer to Drawings for wind velocity.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers and rolls with labels intact and legible. Materials having fire resistance classifications shall be delivered to the Project with labels attached as required. Deliver materials in sufficient quantity to allow continuity of work.
- B. Product shall be stored indoors or in properly protected areas outdoors to provide continuous protection against wetting and moisture absorption. Emulsion shall be stored in temperature above 40 degrees F.
  - 1. Materials stored outdoors shall be on raised platforms and cover top and sides with waterproofed materials properly tied down. Remove wet products from project site.
  - 2. Handle roll goods as to prevent damage to edge or ends.
  - 3. Provide continuous protection of products during delivery, storage, handling, and application.
  - 4. Do not store roofing materials in concentrated areas of roof deck.

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## 1.5 JOB CONDITIONS

### A. Pre-Roofing Conference

1. Before installation of roofing and associated work, meet at Project site with installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of other work in and around roofing that must follow the roofing work (including Mechanical Work, if any), the Architect and other representatives directly concerned with performance of the work, including (where applicable) insurers, test agencies, product manufacturers, governing authorities, and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements (or disagreements) reached and furnish a copy of the record to each party attending. Review foreseeable methods and procedures related to roofing work, including, but not necessarily limited to, the following:
  - a. Review project requirements (Drawings, Specifications and other Contract Documents).
  - b. Review required submittals, both completed and yet to be completed.
  - c. Review status of substrate work (not by the roofing installer), including drying, structural loading limitations, and similar considerations.
  - d. Review availability of materials, tradesmen, equipment, and facilities needed to make progress and avoid delays.
  - e. Review required inspection, testing, certifying, and accounting procedures.
  - f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including the possibility of temporary roofing.
  - g. Review regulations concerning code compliance, environmental protection, health, safety, fire, and similar considerations.
  - h. Review procedures needed for protection of roofing during the remainder of the construction period.
  - i. Consider each party's extant judgment, as advanced in the interest of successful completion of the work.
2. Roofing work may not begin until after the pre-roofing conference. Meeting minutes of the pre-roofing conference shall be reviewed and commented by all involved parties prior to the application of the roofing work.

### B. Weather Condition Limitations

1. Proceed with roofing and associated work only when weather conditions will permit unrestricted use of materials and quality control of the Work being installed, complying with the requirements and with the recommendations of the roofing materials manufacturer.
  - a. Proceed only when the Installer is willing to guarantee the work as required and without additional reservations and restrictions.

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2. Apply in dry weather on a dry deck only. Where rain or inclement weather occur during application, the Work shall stop and not resume until the weather has cleared and the deck is properly dry.

## 1.6 ROOF MAINTENANCE MANUAL

- A. Roofing membrane manufacturer shall submit a Roof Maintenance and Inspection Manual with warranties and project closeout submittals. (Final payment will not be made until roof maintenance manual is submitted).
- B. Roof Maintenance and Inspection Manual shall be bound in a 3 ring binder with name of project, Owner, Architect, and Contractor on front cover.
- C. Roof Maintenance and Inspection Manual shall include:
  1. Cover letter recommending to the Owner that 2 roof maintenance inspections should be conducted per year.
  2. Table of Contents.
  3. Visual inspection checklist indicating specific flashings and details to be inspected. Include items such as base flashing seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, skylight flashings, etc. Applicable items shall be listed per project.
  4. Copies of as-built roofing details.
  5. Roof plan indicating penetrations, detail locations, roof drains, and seams.

## 1.7 WARRANTIES

- A. The Contractor shall furnish to the Owner a written guarantee warranting the roofing insulation and flashing work, including the installation of products furnished by others and installed under this Section of the Work, against defects in materials and workmanship for a period of 5 years from the Date of Substantial Completion.
  1. Guarantee shall include, but not be limited to, roofing, roof insulation, sheet metal flashings and gravel stops, gutters and downspouts, flexible flashings, expansion joints, control joints, and curbs at roof openings.
  2. Guarantee period shall begin on the date of Substantial Completion for the Project or such date that the roof is accepted by the Architect and Owner, if the date is after the date of Substantial Completion.
  3. Repairs required, either permanent or temporary, to roofing or roof flashings under this guarantee to keep the roof watertight shall be made within 3 days after notice of the need for repairs. Should the Contractor fail to make such repairs within the time period, the Owner may have such repairs made and charge the cost to the Contractor.

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- B. In addition to the guarantee above, provide to the Owner a written warranty from the roofing membrane manufacturer, warranting the roofing system membrane, flashing, and all roof system items against leaks and defects in materials and workmanship for a period of 20 years no dollar limit, starting the day of Substantial Completion as established by the Architect.
1. Warranties shall be extended as required to cover the time period between roof membrane completion and the Date of Substantial Completion for the building or portion thereof.

## PART 2 - PRODUCTS

### 2.1 FULLY ADHERED THERMOPLASTIC ROOFING SYSTEM

- A. Basis of Design: Roofing is based upon products and installation details as recommended by Johns-Manville "JM PVC 60 Fleece-Backed", Denver, Colorado. Other acceptable manufacturers are as follows:
1. Fibertite Roofing Systems by Seaman Corporation, Wooster, Ohio.  
<http://www.fibertite.com/>
  2. Carlisle Syntec, Carlisle, Pennsylvania <http://www.carlisle-syntec.com/>
  3. Dow Roofing Systems, Midland, MI <http://www.dowroofingsystems.com/>

### 2.2 MATERIALS

- A. Membrane:
1. Type: fully adhered in cold adhesive.
  2. Thickness: Nominal .060 inch thick reinforced membrane.
  3. Breaking Strength (ASTM D751): 235 pounds.
  4. Ultimate Elongation (ASTM D751): Greater than 100%.
  5. Underwriters Laboratory: Roof system shall be a U.L Class "A" roof.
  6. Shore "A" Hardness (ASTM D2240): 83.
  7. Heat Aging (ASTM D0573): 90% of original.
  8. Cold Resistance (ASTM D2136): -40 degrees F.
  9. Water Vapor Permeability (ASTM E96): 3.5g/m2/day.
  10. Weight Change After Immersion (ASTM D570): 1.5% maximum.
  11. Seam Strength (ASTM D751): 80% of sheet.
  12. Dimensional Stability (ASTM D1240): 0.5%.
  13. Accelerated Weathering (Xenon Arc) (ASTM D2565): 10M hours (No Change).
  14. Membrane shall exceed all requirements of ASTM D4434 Standard Specification for Poly (vinyl chloride) sheet roofing.
  15. UL: Class A.
  16. Factory Mutual: Class 1-150.
  17. Color: White.
- B. Flashing Material:
1. All flashing material shall be flashing membrane as recommended in roofing manufacturer's standard details.

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- C. All seaming shall be hot-air welding tool.
- D. Cold adhesive as recommended by the manufacturer.
- E. Membrane reinforcement shall be polyester scrim.
- F. Membrane shall be U.L, Class A rated.
- G. Roofing membrane and applications as specified shall comply with all requirements of FM I-150. Submit approvals and certifications as specified herein.

## PART 3 - EXECUTION

### 3.1 SUBSTRATE AND SURFACE PREPARATION

- A. Roofing contractor shall verify proper surfaces to receive roofing and flashing materials. Do not apply roofing membrane during periods of precipitation. Do not apply below 32 degrees F.

### 3.2 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
  - 1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
  - 2. Prevent materials from entering and clogging roof drains and conductors, and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecasted.
  - 3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing at end of workday or when rain is forecasted. Remove and discard temporary seals before beginning work on adjoining roofing area.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials immediately upon delivery and again before installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Recheck measurements and dimensions, before starting each installation.

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- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

## 3.3 MEMBRANE INSTALLATION

- A. Follow membrane manufacturers recommended application procedures for the application of the membrane roofing. Install in accordance with the manufacturers written installation instructions.
- B. Provide all items and accessories as required for a complete installation in every respect.

## 3.4 FLASHING INSTALLATION

- A. Cover all vertical surfaces with membrane as recommended by the manufacturer.
- B. Weld and adhere flashings to roofing membrane as recommended by the manufacturer.
- C. Install walkways pads where indicated on the Drawings in accordance with the manufacturers written installation instructions.
- D. General:
  - 1. All penetrations shall be sealed.
  - 2. At roof drains, end membrane 1" inside drain clamping ring.
  - 3. Drain Protection: Roof drains shall be covered at all times while work is in progress and opened for water flow at time when work is not in progress.
- E. All soil stacks and roof vents penetrating the roof shall receive premolded pipe flashings with stainless steel clamp.

## 3.5 PROTECTION OF ROOFING

- A. Upon completion of roofing, institute appropriate procedures for protection of roofing during remainder of construction period.

END OF SECTION 07 54 00

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SECTION 07 60 00  
FLASHING AND SHEET METAL

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Metal wall flashing and counterflashing.
  - 2. Coping caps
  - 3. Miscellaneous sheet metal accessories.
  - 4. Sealants and bonding agents between components of this Section and between the roof and other materials.
- B. Provide all accessories and items essential for the completeness of the sheet metal installation. Such items, unless otherwise shown on the Drawings or specified, shall be the same kind of materials as the item to which applied. Nails, screws, and bolts shall be of the types suited for the purpose intended, and shall be compatible with the metal to which it will contact.
- C. Forming and assembling of sheet metal components shall be performed using methods that will not void the manufacturer's finish warranties.
- D. All flashing and sheet metal items shall be provided and installed to provide for a complete watertight and weathertight installation in every respect.

### 1.2 SUBMITTALS

- A. Product Data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
- B. Samples of the following flashing, sheet metal, and accessory items:
  - 1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.
  - 2. 12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.
- C. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems.
- D. Submit coping cap watertight guarantee as specified herein.
- E. Manufacturers and Fabricators: Certification that the individual items, to be installed, meet the wind-loading requirements in Article 1.5 of this specification section.

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## 1.3 QUALITY ASSURANCE

- A. Except as otherwise shown on Drawings or specified, the workmanship of sheet metal work, method for forming joints, anchoring, cleating and provisions for expansion shall conform to the standard details and recommendations of the Copper and Brass Research Association; and workmanship shall be of the best quality, in accordance with best trade practice and the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
- B. Where pre-engineered manufactured systems are specified, other field fabricated or shop fabricated substitutions will not be accepted.
- C. Fabricator and installer shall be a company specializing in sheet metal work and installation with five (5) years documented experience.

## 1.4 PROJECT CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

## 1.5 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for locale of Project:
- C. Copings shall be designed to meet wind-loading requirements of the 2007 Florida Building Code with the 2009 Supplement. Refer to structural drawings for wind velocities and zones.
- D. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. 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, ambient; 180 deg F, material surfaces.
- E. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. The type and locations of the various kinds, gages, thickness, and finish of sheet metal to be used is specified hereinafter under the individual items. Where sheet metal is indicated on Drawings and kind or type of metal is not definitely specified, sheet metal shall match the type as used on the rest of the project.
- B. Stainless Steel: AISI Type 302/304, complying with the latest edition of ASTM A 167, 2D annealed finish, soft, except where harder temper required for forming or performance; 0.0156-inch thick (28 gauge) except as otherwise indicated.
- C. Prefabricated Reglets and Counterflashings: Shall be as manufactured by the Fry Reglet Corp., 625 S. Palm Avenue, Alhambra, California.
  - 1. Type: Shall be type "SM" made of stainless steel with slots for expansion, punched approximately 16 inches o.c. for surface mounting. Provide factory fabricated mitered corners.
  - 2. Provide suitable screws and washers for mounting to wall, similar to those indicated on the Drawings.
  - 3. Provide Fry "Springlock" counterflashing.
  - 4. Products of other manufacturers will be acceptable providing they meet or exceed the quality specified, and they can provide products of the type, size, and function required.
    - a. Architectural Products Co., Covington, Kentucky.
- D. Coping Caps
  - 1. 22 gauge galvanized steel formed as indicated on the Drawings and as required for the installation. Support shall be coping chairs with perforated cleats. Concealed splice plate shall match color and finish of coping caps.
  - 2. Finish: Clear anodized aluminum, .7 mil minimum thickness per AAMA.
  - 3. Manufacturer: "Permasnap Coping" by W.P. Hickman Company, Asheville, North Carolina; or "Perma-Tite Coping" by Metal Era Roof Edge Systems, Waukesha, Wisconsin; "Presto Lock Coping System" by Johns Manville, Denver, Colorado; "Snap-Tight Coping" by Architectural Products Company, Hebron, Kentucky.
  - 4. Shop or field fabricated coping caps are not acceptable.
  - 5. Provide manufacturers 10 year weathertightness guarantee with all coping caps.
  - 7. Provide 70% Kynar finish in color as selected by the Architect.
  - 8. All cleats shall be continuous, no exceptions.

### 2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners: Same metal as flashing/sheet metal or other non- corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

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- B. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.
- C. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Section 07920, Sealants and Caulking.
- D. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.
- E. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

## 2.3 FABRICATION

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

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## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. The Installer must examine substrates and conditions under which metal flashings will be installed, and notify Contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

### 3.2 PREPARATION

- A. Separate dissimilar metals from each other by painting each metal surface in area of contact with a heavy application of bituminous coating.

### 3.3 INSTALLATION REQUIREMENTS

- A. General: Comply with recommendations with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal 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 weatherproof.
- B. Install work with provisions for thermal expansion of flashings, gravel stops, and other items exposed for more than 15 feet continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams where shown, or if not shown, in conformance with applicable recommendations of "Architectural Sheet Metal Manual" by SMACNA.
- C. Sheet metal work shall be watertight and weathertight; lines, arises, and angles sharp and true; plain surfaces free from waves and buckles. Workmen shall be experienced in the trade and thoroughly capable of performing the Work in accordance with these requirements.
- D. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.
- E. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.
- F. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- G. Prefabricated Reglets and Counterflashing
  - 1. Apply continuous bead of sealant or plastic cement to back of type "SM" reglet.

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2. Install Type "SM" reglet on surface of flexible flashing on wall parallel to roof slope with fasteners furnished by manufacturer. Fill top groove with sealant and tool tight against wall with surface of sealant sloping to outside.
  3. Position counterflashing into reglet and "snap" into place against wall flashing.
- H. General Flashing Nonmoving Joints: Fabricated the same as paragraph 1. above, except joints shall be "flat-rock" seamed rather than lap seam.
- I. Flashing at Roof Penetrations (Miscellaneous)
1. Work under this Section shall include the flashing of roof penetrations not otherwise specified under other Sections.
  2. Flashing at roof penetrations not detailed on the Drawing shall be performed according to the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), subject to approval by the Architect.
- J. Provide all items and accessories as required for a complete installation in every respect.

## 3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

## 3.5 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.

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- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

END OF SECTION 07 60 00

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SECTION 07 72 33  
ROOF HATCHES

## PART 1 -GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for furnishing and the installation of prefabricated roof hatches with integral support curbs, operable hardware, and counterflashings, as shown on the Drawings and as specified herein.
  - 1. The Work of this Section also includes fall protection at the roof hatches as required by OSHA.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements. Show compliance with OSHA 29 CFR roof fall protection.
- B. Submit complete shop drawings showing sizes, materials, and details of construction.
  - 1. Include documentation showing compliance with wind loading requirements.
- C. Submit warranty as specified herein.
- D. Submit manufacturer's product data and technical information.

### 1.3 PRODUCT HANDLING

- A. All materials shall be delivered in manufacturer's original packaging.
- B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- C. Remove protective wrapping immediately after installation.

### 1.4 QUALITY ASSURANCE

- A. Roof hatches shall be designed to meet wind-loading requirements for the 2007 Florida Building Code with the 2009 Supplement. Refer to Structural Drawings for wind velocity.

### 1.5 JOB CONDITIONS

- A. Verify that other trades with related work are complete before installing roof scuttle(s).
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.

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- D. Coordinate installation with roof membrane and roof insulation manufacturer's instructions before starting.
- E. Observe all appropriate OSHA safety guidelines for this work.

## 1.6 WARRANTY

- A. Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of five (5) years from the date of Substantial Completion. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Roof hatch shall be the product of Milcor Lima, Ohio; specified as the type, size, function, and quality required. <http://www.milcorinc.com/html/milcor.html>
- B. Products of the following manufacturers are acceptable, providing their products equal or exceed the quality and function specified:
  - 1. Bilco Company, New Haven, Connecticut; [www.bilco.com](http://www.bilco.com)
  - 2. Babcock-Davis Hatchways, Inc., Arlington, MA; [www.cierraproducts.com](http://www.cierraproducts.com)
- C. Basis of Design: Type: Milcor "Model M Series. Size: 30" x 36"

### 2.2 MATERIALS AND CONSTRUCTION

- A. Cover: High strength composite panels with 14 gauge zinc-coated, prime-painted steel exterior and 22 gauge zinc-coated, prime painted steel liner bonded to core of 2" rigid foam-type insulation.
- B. Curb shall be 12 inches in height and of 14 gauge zinc-coated steel, 14 gauge zinc-coated steel integral counterflashing, 3-1/2 inch wide mounting flange with pre-drilled holes, and one inch (1") fiberboard insulation on the exterior.
- C. Hatch shall be completely assembled with heavy steel pintle hinges, automatic locking hold-open arms, snap latch, turn handles, padlock hasp inside, and closed-cell rubber weather seal.
- D. Torsion Spring: Cover operation shall be assisted by a torsion spring mounted within the confines of the cover. Springs mounted in frame are unacceptable.
- E. Hardware: All hardware shall be zinc or cadmium plated.

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- F. Prime Paint: All exposed steel shall be prime painted. Primer shall be compatible with finish coats as specified in Section 09 91 00, Painting. Verify primer compatibility in writing to Architect. If prime paint is not compatible, primer to be provided and installed by the roof hatch manufacturer shall be as specified in Section 09 91 00, Painting.
- G. Provide all items and accessories as required for a complete installation in every respect.

## 2.3 FALL PROTECTION

- A. Milcor "Safety Rail" as the basis of design. Products by the following manufacturers are also acceptable: [http://www.milcorinc.com/html/roof\\_hatches\\_4.html](http://www.milcorinc.com/html/roof_hatches_4.html)
  - 1. "Bil-Guard" Hatch Railing System by Bilco Company, New Haven, Connecticut. <http://63.118.235.72/index-2.htm>
  - 2. "PHSR-SS" Series by Babcock-Davis, Minneapolis, Minnesota. <http://www.cierraproducts.com/>
- B. Railing system shall be on two side of the roof hatch, constructed of 1-1/2" diameter galvanized steel top rail and mid rails. Exiting or entrance front of roof hatch shall have a safety chain from one top rail to the other. Safety chain shall be galvanized.
- C. Railing height shall be 42" minimum from roof surface.
- D. Railing system shall be OSHA compliant.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install hatch in accordance with the manufacturer's printed instructions and with details shown on the Drawings.
- B. Provide all items as required for a complete installation in every respect. Failure to include all items will not relieve contractor and manufacturer from specification requirements.

### 3.2 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

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- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Recheck measurements and dimensions, before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

### **3.3 ADJUSTMENT AND DEMONSTRATION**

- A. After installation moving parts shall be properly adjusted to give free, effortless operation. Demonstrate to the Architect that components are fully operable and will perform as intended.

END OF SECTION 07 72 33

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SECTION 07 92 00  
SEALANTS AND CAULKING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary to complete sealant work, both interior and exterior of the Project. The extent of each type of sealant and caulking work is indicated on the Drawings and specified herein.
1. Work of this Section is to be subcontracted to a single firm specializing in sealant and caulking installation.
  2. Install in exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:
    - a. Joints between different materials listed above.
    - b. Perimeter joints between materials listed above and frames of doors and windows.
    - c. Control and expansion joints in ceiling and overhead surfaces.
    - d. Other joints as indicated or required.
  3. Install in exterior joints in horizontal traffic surfaces as indicated below:
    - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    - b. Joints between different materials listed above.
    - c. Other joints as indicated or required.
  4. Install in interior joints in vertical surfaces and horizontal non-traffic surfaces as indicated below:
    - a. Perimeter joints of exterior openings where indicated.
    - b. Joints between tops of non-load-bearing unit masonry walls and underside of cast-in-place concrete slabs and beams.
    - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - e. Perimeter joints of toilet fixtures.
    - f. Other joints as indicated or required.
  5. Install in interior joints in horizontal traffic surfaces as indicated below:
    - a. Control and expansion joints in cast-in-place concrete slabs.
    - b. Other joints as indicated or required.
  6. The Work of this Section also includes the preparation of the sealant joint substrates and the installation of the sealant joint backings.
- B. Surface Hardness: Provide types of sealant to withstand anticipated abrasive or possible indentation as recommended by manufacturer.

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- C. Compatibility: Provide materials that are compatible with the joint surfaces, joint fillers, and other materials in the joint system.

## 1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

## 1.3 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product data from manufacturers for each joint sealant product required.
  - 1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- E. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- F. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.
- G. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- H. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.
- I. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.

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- J. Submit sealant warranties as specified herein.
- K. Submit pre-caulking conference meeting minutes.

## 1.4 QUALITY ASSURANCE

- A. Obtain elastomeric materials only from manufacturers who will, if required, send a qualified technical representative to project site for the purpose of advising the Installer of proper procedures and precautions for the use of the materials.
- B. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
  - 1. Shall be a sealant and caulking subcontractor with a minimum of 5 years of successful experience in the application of the types of materials required, and who agrees to employ only skilled tradesmen for the Work.
- C. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying progress of the Work.
- D. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
- E. Preconstruction Compatibility and Adhesion Testing: Submit joint sealant manufacturers samples of materials that will contact or affect joint sealants for compatibility and adhesion testing as indicated below:
  - 1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
    - a. Perform tests under normal environmental conditions that will exist during actual installation.
  - 2. Submit not less than 9 pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
  - 4. Investigate materials failing compatibility or adhesion tests and obtain joint sealant manufacturer's written recommendations for corrective measures, including use of specially formulated primers.
  - 5. Testing will not be required when joint sealant manufacturer is able to submit joint preparation data required above that are acceptable to Architect and are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

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- F. Product Testing: Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.
1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
  2. Include test results performed on joint sealants after they have cured for 1 year.
  3. VOC Limits (Regulation 8, Rule 51 of the Bay Area Air Quality Management District. [www.baaqmd.gov](http://www.baaqmd.gov)):
    - a. Sealants

1)	Architectural	250 g/L
2)	Roadways	250 g/L
3)	Roofing Material Installation	450 g/L
4)	PVC Welding	480 g/L
5)	Other	420 g/L
    - b. Sealant Primers:

1)	Architectural (Non-Porous)	250 g/L
2)	Architectural (Porous)	775 g/L
3)	Other	750 g/L
  4. VOC Limits (South Coast Air Quality Management District Rule 1168. <http://www.aqmd.gov/rules/html/r1168.html>):
    - a. Adhesives (Welding and Installation):

1)	Non-Vinyl Backed Installation	150 g/L
2)	Carpet Pad Installation	150 g/L
3)	Wood Flooring Installation	150 g/L
4)	Ceramic Tile Installation	130 g/L
5)	Dry Wall and Panel Installation	200 g/L
6)	Subfloor Installation	200 g/L
7)	Rubber Floor Installation	150 g/L
8)	VCT and Asphalt floor tile installation	150 g/L
9)	PVC Welding	510 g/L
10)	CPVC Welding	490 g/L
11)	ABS Welding	400 g/L
12)	Plastic Cement Welding	350 g/L
13)	Cove Base Installation	150 g/L
14)	Adhesive Primer for Plastic	650 g/L
15)	All Others	250 g/L
    - b. Adhesives (Substrates)

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1)	Metal to Metal	30 g/L
2)	Plastic Foams	120 g/L
3)	Porous Material Except Wood	120 g/L
4)	Wood	30 g/L
5)	Fiberglass	200 g/L

- G. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
  2. Conduct field tests for each application indicated below:
    - a. Each type of elastomeric sealant and joint substrate indicated.
    - b. Each type of non-elastomeric sealant and joint substrate indicated.
  3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
  4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
  5. Test Method: Test joint sealants by hand pull method described below:
    - a. Install joint sealants in 5-foot joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
    - b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2-inch cuts. Place a mark 1 inch from top of 2-inch piece.
    - c. Use fingers to grasp 2-inch piece of sealant just above 1-inch mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
  6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
  7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- H. A pre-caulking conference shall be held with the Architect and other involved parties to review conditions, materials, colors, and other requirements.

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## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

## 1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  - 2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4.4 deg C).
  - 3. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.
- D. Preparation of joint surfaces, backing, and the conditions under which the sealant and caulking is to be installed shall conform to manufacturer's recommendations.
  - 1. Use of bond break tape is prohibited without the expressed permission of the Architect. Each situation will be evaluated with regard to inability to properly use backer rod to prevent adhesion.

## 1.7 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

## 1.8 WARRANTIES

- A. All exterior and building envelope weathertight and watertight sealants shall be warranted by the sealant manufacturer for a period of twenty (20) years from the Date of Substantial Completion. Include coverage for installed sealants and accessories which fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, and or do not cure.

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- B. All exterior and building envelope weathertight and watertight sealants shall be guaranteed by the specialized sealant contractor for a period of five (5) years from the Date of Substantial Completion, to be weathertight, watertight and moisture tight. Contractor shall correct defective or failed joints and work within this time period at no cost to the building Owner.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
  - 1. Sealants in exterior vertical expansion and control joints in face brick shall match the face brick color. Custom color may be required. An exact match in color is required as selected by the Architect.
  - 2. Sealants in exterior horizontal control and relieving joints in face brick shall match the mortar color. Custom color may be required. Coordinate with the color selections for mortar in Section 04 05 13, Mortar.
  - 3. Provide manufacturer's complete line of standard and custom colors for Architect's selection. If standard colors do not match the Architect's selection, custom colors will be required at no extra cost.

### 2.2 MATERIALS

- A. General
  - 1. Where the term "Acceptable Standard" is used within this Section, it refers to the manufacturer and product listed, which is specified as the type and quality required for this Project.
  - 2. Products of other manufacturers will be considered, providing their products equal or exceed the quality specified, and they can provide products of the type and quality required.
  - 3. Single source responsibility for joint sealer materials: Obtain joint sealer materials from a single manufacturer for each different product required.
  - 4. Compatibility: Provide joint sealers, joint fillers, and other related materials that are compatible with on another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and final experience.

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- B. Caulking Compounds (Acrylic Latex Sealant)
  - 1. Latex rubber modified, acrylic emulsion polymer sealant compound; manufacturer's standard, one part, non-sag, mildew resistant, acrylic emulsion sealant complying with ASTM C834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.
  - 2. Acceptable Standard
    - a. "Sonolac"; Sonneborn Building Products, Inc.
    - b. "Acrylic Latex 834"; Tremco, Inc.
    - c. "Acrylic Latex Caulk with Silicone"; DAP, Dayton, Ohio
  
- C. One-Part Elastomeric Sealant (Silicone) (Exterior 20 year warranty)
  - 1. One component elastomeric sealant, complying with ASTM C920, Class 25, Type NS (non-sag), unless Type S (self-leveling) recommended by manufacturer for the application shown.
    - a. Acceptable Standard
      - 1) "Pecora 864 Architectural Silicone Sealant; Pecora Corp.
      - 2) "Dow Corning 795"; Dow Corning Corp.
      - 3) "Silpruf"; General Electric
      - 4) "Omniseal"; Sonneborn Building Products, Inc.
      - 5) "Spectrem 2"; Tremco Mfg. Co.
    - b. All exterior and building envelope weathertight and watertight sealants shall be silicone unless specified otherwise.
  
- D. One-part self-leveling polyurethane sealant, (for traffic areas and slabs-on-grade)
  - 1. One component polyurethane self-leveling sealant, complying ASTM C920, Type S, Grade P, Class 25.
    - a. Acceptable Standard
      - 1) "Sonolastic SL 1"; Sonneborn Building Products, Inc.
      - 2) "NR-201 Urexpan"; Pecora Corp.
      - 3) "Vulkem 45 SSL"; Tremco
  - 2. Install in all horizontal control joints in concrete slabs-on-grade.

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## E. Miscellaneous Materials

1. Provide joint cleaner and joint primer sealer as recommended by the sealant or caulking compound manufacturer.
2. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate tests and field tests.
3. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in service performance.

## 2.3 JOINT SEALANT BACKING

- A. Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, non-outgassing in unruptured state.

## 2.4 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, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous 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 indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. 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 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.

### 3.3 SELECTION OF MATERIAL

- A. Caulking compounds shall be used for interior nonmoving joints and at locations specifically indicated on Drawings.

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- B. One component elastomeric silicone sealants shall be used at exterior and interior joints where thermal or dynamic movement is anticipated
- C. One part self-leveling polyurethane sealants shall be used for exterior and interior horizontal joints subject primarily to pedestrian traffic and light and moderated vehicular traffic, and in all control joints in slab-on-grade; interior. Do not use in polished concrete surfaces or in the Studio.
- D. Acoustical joint sealants shall be used at all interior walls.
- E. All exterior sealants shall be silicone.

## 3.4 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
  - 1. Interior joints that require caulking are to be caulked with the specified caulking compound, unless noted otherwise.
  - 2. Exterior joints that require sealant are to be filled with one of the specified sealants even though the note may read "Caulked".
  - 3. Joints to be filled shall be thoroughly dry and free from dust, dirt, oil, and grease at the time of application or caulks or sealants.
  - 4. Expansion and control joints in exterior walls shall have the joint filler material built into the wall, or between wall and slab, at the time of construction.
  - 5. Masking: Metal shall be masked with masking tape, as well as other surfaces where its required to prevent the sealant smearing the adjacent surface. Upon completion of the caulking, remove the tape.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers.
    - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

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- E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

## 3.5 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

## 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

## 3.7 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

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- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

END OF SECTION 07 92 00

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# **Division 08**

Openings



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SECTION 08 11 00  
STEEL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes hollow metal doors and frames. Furnish materials and equipment necessary for complete installation of hollow metal doors, frames, and related items necessary to complete the Work indicated on Drawings and specified herein.
- B. Coordination: Refer to Section 08 81 00 to obtain glass thickness requirements. Provide properly sized stops and bead to house the specified glass according to the glass manufacturer's recommendations and as indicated.
- C. The Work of this Section also includes asphaltic emulsion coating for the backside of all steel frames installed in CMU or concrete walls.

### 1.2 SUBMITTALS

- A. Product Data: Details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- B. Shop Drawings:
  - 1. Show elevations, details and methods of assembling sections, hardware locations and installation methods, dimensions, shapes of materials, anchorage and fastening methods, wall opening construction details, and weatherstripping.
  - 2. Provide schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings and Schedules.
  - 3. Shop drawings shall be signed and sealed by a licensed engineer registered in the State of Florida.
  - 4. Calculations for wind load design shall be stamped, sealed and signed by a Professional Engineer in the State of Florida verifying compliance with ASCE/SEI 7, latest edition.
  - 5. Sample of Approved Product Label and location of attachment to assembly.
- C. Label Construction Certification: For door assemblies required to be fire-rated and exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.
- D. Obtain approval of shop drawings prior to proceeding with manufacturing
- E. Sample warranty

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## 1.3 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" ANSI/SDI-100 and as herein specified.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies whose fire resistance characteristics have been determined per ASTM E 152 and which are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.
- C. Hollow metal supplier shall be a qualified direct distributor of products to be furnished. In addition, the distributor shall have in their regular employment an A.H.C./C.D.C. who will be available at reasonable times to consult with the Architect regarding matters affecting the door and frame openings.
- D. Exterior steel doors shall be designed to meet wind-loading requirements for the 2007 Florida Building Code with 2009 Supplement. Refer to Structural Drawings for wind velocity.
  - 1. Exterior Door Assembly Labeling: Each exterior door assembly that has a glass lite in the assembly shall be tested by an approved independent testing laboratory and have an "approved product label" affixed to the assembly per FBC Chapter 17.
  - 2. Hurricane impact resistant units shall be resistant to penetration by flying missiles per SSTD 12-99.
- E. Positive Pressure Test: Where fire rated assembly is required, provide doors that comply with UL 10C, Category A, per the 2007 Florida Building Code with 2009 Supplement.
- F. Positive Pressure: All fire labeled doors on this project shall conform to the <%Codes%> standards for fire testing of door assemblies. All fire-rated doors and frames shall conform to the Positive Pressure Testing and shall carry a supplemental label on doors and frames that indicate the manufacturer has tested and passed required testing.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish.
- B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters that could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inches spaces between stacked doors to promote air circulation.

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## 1.5 WARRANTY

- A. Hollow metal doors and frames shall be supplied with a one (1) year warranty from the Date of Substantial Completion, against defects in materials and workmanship.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Except as otherwise specified herein or specifically approved by the Architect, hollow metal doors and frames shall be products of one of the following manufacturers subject to compliance with Specification requirements.
  - 1. Ceco Door Products, An ASSA ABLOY Group Co., Milan, TN; [www.cecodoor.com](http://www.cecodoor.com)
  - 2. Steelcraft Door and Frame Products, Cincinnati, Ohio; [www.steelcraft.com](http://www.steelcraft.com)
  - 3. Curries Company, An ASSA ABLOY Group Co., Mason City, Iowa; [www.curries.com](http://www.curries.com)
  - 4. Republic Doors and Frames, McKenzie, TN <http://www.republicdoor.com/>

### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 1008.
- B. Galvanized Steel Sheets: Hot dipped galvanized in accordance with ASTM A 653, with A60 coating designation, mill phosphatized.
- C. Supports and Anchors: Fabricate of not less than 18-gage galvanized sheet steel.
- D. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable.
- E. Primer:
  - 1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A250.10, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."
  - 2. Primer: Galvanized steel doors or frames – factory applied, air-dried, rust inhibitive touch-up primer complying with ANSI A250.10 where galvanizing has been removed during fabrication.
  - 3. Shop applied primers shall be compatible with finish paint specifications as specified in Section 09 91 00, Painting. Primers shall be as specified in Section 09 91 00, or letter of compatibility must accompany the shop drawings. Contractor shall be responsible to coordinate all required items for the proper installation of the finish paint and primers as specified. Ascertain compatibility during bidding period. If compatibility is not ascertained, the painting contractor will be required to provide and install all primers as specified in Section 09 91 00, Painting.

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## 2.3 FABRICATION, GENERAL

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at the project site. Lock edges of doors shall be beveled 1/8 inch in 2 inches.
- B. Panels and edge channels of exterior doors shall be fabricated from galvanized sheet steel. Panels and edge channels of interior doors shall be fabricated from cold rolled or galvanized sheet steel. Sizes, types, and assemblies shall be as indicated on the Drawings, Door Hardware Schedule, and as specified herein.
- C. Thermal-Rated (Insulating) Assemblies:
  - 1. At exterior locations and elsewhere as shown or scheduled, provide doors which have been fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C 236.
  - 2. Unless otherwise indicated, provide thermal-rated assemblies with U-factor of 0.24 BTU/(hr\*ft sq\*deg F) or better.
- D. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold rolled or hot rolled steel (at fabricator's option).
- E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts. Include stainless steel fasteners at all exterior locations.
- F. Door Hardware Preparation:
  - 1. Prepare hollow metal units to receive mortised and concealed door hardware, including cutouts, reinforcing, drilling, and tapping in accordance with final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation."
  - 2. Reinforce hollow metal units to receive surface applied hardware. Drilling and tapping for surface applied door hardware may be done at project site.
  - 3. Locate finish hardware as shown on final shop drawings, or if not shown, in accordance with recommended hardware locations specified in "S.D.I. 100-91, Recommended Specifications, Standard Steel Doors and Frames," as published by the Steel Door Institute.
  - 4. Reinforce all steel doors and frames to receive surface mounted closers, whether or not scheduled to receive them.
  - 5. Door frames are to be pre punched at the stops to receive security wiring.
- G. Shop Painting
  - 1. Clean, treat, and shop paint all surfaces of fabricated hollow metal doors and frames, including galvanized surfaces plus back prime of all hollow metal frames.
  - 2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.
  - 3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive field applied paint.

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- H. Asphaltic Emulsion Coating: Apply on the frames in the fabricator's shop; field application is not acceptable.

## 2.4 DOOR TYPES

- A. The following door types shall conform to the Steel Door Institute Standards as described in SDI 100 and ANSI A250.8.
- B. All doors shall be Grade III, 1-3/4 inches extra heavy duty, 14 gage galvanized, Model 2, seamless design.
- C. Lock edge of interior and exterior doors shall be beveled 1/8 inch in 2 inches.
- D. Lockseam construction with seams on edges, not face, of door.

## 2.5 DOOR ACCESSORIES

- A. Glass Stops: Shall be provided for vision light openings.
- B. Verify undercut requirements with Section 08 71 00, Door Hardware, for exterior doors with thresholds. Standard undercut will not be acceptable for low profile handicap thresholds.

## 2.6 FRAME TYPES

- A. All door frames shall be 14 gauge, fabricated from galvanized sheet steel.
- B. Welded Frames: Frames shall be mitered or butted and set-up and welded, "SUW" with welds on exposed surfaces, dressed smooth and flush. Provide a temporary spreader bar securely fastened to the bottom of each frame.
  - 1. Welded frames shall be smooth, even, and have no blemishes or irregularities in finish or surface on all exposed sides and planes.

## 2.7 FRAME ASSEMBLIES

- A. Frame Anchors
  - 1. Wall anchors for frame attachment to masonry construction: Masonry anchors, adjustable, flat, corrugated or perforated 'T' shaped anchors with leg not less than 2 inches wide by 10 inches long or masonry "wire" type not less than 3/16 inch diameter.
  - 2. Wall anchors for attachment to drywall partitions.
    - a. Use steel anchors sized to accommodate frame jamb depth and face dimension on all welded frames.
  - 3. All frame jamb anchors to be provided; on each jamb per 30 inches of frame height or fraction thereof.

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4. Floor anchors: Angle clip type
    - a. 16 gage minimum.
    - b. To receive 2 fasteners per jamb.
    - c. Welded to the bottom of each jamb.
  5. In place masonry or concrete:
    - a. 3/8 inch countersunk flat head stove bolt expansion shields.
    - b. Weld pipe spacers or other type of spacers per manufacturer's standard design in back of frame soffit to protect frame profile during tightening of bolts and anchors.
  6. Sleeve anchors shall be fire rated for the types of openings required.
- B. Stops and Beads: Furnish 20 gauge metal glazing beads with the hollow metal frames and transoms, side lights, interior glazed panels, and other locations where beads are indicated in pressed steel frames. Glazing beads shall be on the interior side of exterior frames of transoms and side lights.
- C. Plaster Guards: Provide 26 gage steel plaster guards or mortar boxes, welded to the frame, at back of door hardware cutouts where mortar or other materials might obstruct hardware operation.
- D. Door Silencers: Drill stops and install 3 silencers on strike jambs of single swing frames and 2 silencers on heads of double swing frames.
- E. Provide 3/4-inch diameter hole in frame head for installation of conduit for security system. Refer to electrical drawings for doors indicated to receive intrusion alarm. Coordinate location in each frame with Owner.

## 2.8 ASPHALTIC EMULSION COATING

- A. Emulsion coating for steel door frames shall be water-based, brush applied, emulsion dampproofing.
1. Sonneborn Hydrocide 700B by BASF Construction Chemicals, LLC; [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com)
  2. Sealmastic by W.R. Meadows. [www.wrmeadows.com](http://www.wrmeadows.com)
  3. Karnak #100 by Karnak, Clark, New Jersey. [www.karnakcorp.com](http://www.karnakcorp.com)
- B. Install in all exterior and interior steel door and window frames installed in CMU or concrete walls.

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## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protect doors and frames from damage during transportation and at the job site; store at the site under cover on wood blocking or suitable floors.
- B. After installation, protect doors and frames from damage during subsequent construction activities.

### 3.2 INSTALLATION

- A. Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames," unless otherwise indicated.
  - 1. Except for frames located at existing concrete, masonry or drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
  - 2. In masonry construction, locate 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry Tee anchors.
  - 3. Install fire-rated frames in accordance with NFPA Standard No. 80.
  - 4. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In closed steel stud partitions, attach wall anchors to studs with screws.
  - 5. Set frames in position; plumb, align, and brace securely until permanent anchors are set. Anchor bottom of frames to floors with expansion bolts or with power fasteners. Where frames require ceiling struts or other structural overhead bracing, they shall be anchored securely to ceilings or structural framing above, as indicated or specified.
  - 6. The finished work shall be rigid, neat in appearance, and free from defects. Form molded members straight and true with joints coped or mitered, well formed, and in true alignment. Welded joints on exposed surfaces shall be dressed smooth so they are invisible after finishing.
  - 7. Grouting of metal frames is included in the Work of Section 04 20 00. Spot grouting of metal frames in gypsum wallboard partitions is included in the Work of Section 09 29 00.
  - 8. Where anchor bolts are used in concrete or masonry openings, the bolt head shall be recessed, filled with bondo and sanded smooth.
  - 9. Provide filler plate at all hardware preps, such as hinge and strike preps, that are unused.
- C. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.
  - 1. Install fire-rated doors with clearances as specified in NFPA Standard No. 80-95

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- D. Install asphaltic emulsion coating on inside (concealed) faces of all frames installed in CMU or concrete walls. Apply at 1/8" thick minimum and allow to dry prior to the installation of the grout.
- E. Provide all items and accessories as required for a complete installation in every respect.

## 3.3 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

## 3.4 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.
- C. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

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## 3.5 FIELD QUALITY CONTROL

- A. Damaged work will be rejected and shall be replaced with new work at no additional cost to the Owner or Architect.
- B. After installation, protect doors and frames from damage during subsequent construction activities.

END OF SECTION 08 11 00

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SECTION 08 31 00  
ACCESS DOORS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for installation of access doors.
- B. Install as needed to the size required, the locking requirements of the Owner, and meeting applicable code requirements.
- C. Refer to Division 23, Mechanical for mechanical access door requirements.
- D. Refer to Division 26, Electrical for electrical access door requirements.
- E. Coordinate locations and sizes of access doors with Plumbing, Mechanical and Electrical Drawings. Provide all access doors as required for complete access to concealed valves, pipes, connections, etc. as required. Coordinate and be responsible for same.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage devices.
- C. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching, or locking provisions, and other data pertinent to installation.
- D. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

### 1.3 QUALITY ASSURANCE

- A. Coordinate locations and sizes of access doors with Electrical and Mechanical Drawings. Provide access doors as required for access to concealed valves, pipes, connections, motors, and other items that will need to be accessed for maintenance purposes.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide access doors by one of the following:
1. Bar-Co., Inc., Enterprise, AL; [www.alfabinc.com](http://www.alfabinc.com)
  2. Cesco Products, Florence, KY; [www.cescoproducts.com](http://www.cescoproducts.com)
  3. J. L. Industries, Inc., Bloomington, MN; [www.jlindustries.com](http://www.jlindustries.com)
  4. Karp Associates, Inc., Maspeth, NY; [www.karpinc.com](http://www.karpinc.com)
  5. Milcor, Inc., A Gibraltar Co., Holland, OH; [www.milcorinc.com](http://www.milcorinc.com)
  6. Nystrom, Inc., Minneapolis, MN; [www.nystrom.com](http://www.nystrom.com)

### 2.2 MATERIALS AND FABRICATION

- A. Furnish each access door assembly manufactured as an integral unit, complete and ready for installation.
- B. Masonry Walls: For masonry construction, furnish frames with adjustable metal masonry anchors. Frames shall be 16 gauge cold rolled steel. Door shall be 20 gauge cold rolled steel. Hinges shall be cold rolled with stainless steel pin, continuous piano type. Size: 24 x 24 inch, unless indicated otherwise.
- C. Provide one key-operated cam lock per access door. Furnish 2 keys per lock. Key locks alike, unless otherwise scheduled.
1. If only one latching device is required, then it shall be a key operated cam lock.
- D. Access doors and frames shall be factory primed with manufacturers standard primer paint.
- E. Ceilings: For ceilings, furnish perforated frames with drywall bead. Access door face shall be recessed to accept a single layer of 5/8 inch gypsum board. 16 gauge cold rolled steel frame with galvanized drywall taping bead attached to all four sides. Hinges shall be cold rolled with stainless steel pin, continuous piano type. Size: 24 x 24 inch, unless indicated otherwise.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access doors and panels.
- B. Coordinate installation with work of other trades.
- C. Coordinate locking requirements with the Owner.
- D. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

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- E. Finish: Field paint by Section 09 91 00, Painting.
- F. Provide all items and accessories as required for a complete and thorough installation in every respect.

## 3.2 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames which are warped, bowed, or otherwise damaged.

## 3.3 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

END OF SECTION 08 31 00

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SECTION 08 33 23  
OVERHEAD COILING DOORS

## PART 1 – GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of the overhead coiling doors as shown on the Drawings and specified herein.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product Data: Submit manufacturer's standard, technical data for each required type of unit. Include data on manufacturer's prime paint.
- C. Shop Drawings: Show elevations of each door type, construction details and methods of assembling sections, hardware locations and installation methods, dimensions and shapes of materials, anchorage and fastening methods, door frame type and details, wall opening construction details, weatherstripping, and finish requirements.
  - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings and Schedules.
  - 2. Shop drawings shall be signed and sealed by a licensed Professional Engineer registered in the State of Florida.
  - 3. Calculations for wind load design shall be stamped, sealed and signed by a Professional Engineer in the State of Florida verifying compliance with ASCE/SEI 7-05.
  - 4. Submit current Miami-Dade NOA for all exterior door and window units.
- D. Warranty: Submit sample warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. All exterior overhead coiling doors (located in exterior walls) shall be designed to withstand 20 PSF windload. Endlocks/windlocks shall be installed on every slat on doors over 14 feet wide.
- B. All exterior overhead coiling doors (located in exterior walls) shall be designed to withstand 130 MPH wind (x 1.10 importance factor) per ASCE/SEI 7-05.
- C. Overhead coiling doors shall be designed to a standard maximum of 25 cycles per day and an overall maximum of 50,000 operating cycles for the life of the door.

### 1.4 WARRANTY

- A. Manufacturer's Warranty: All doors shall be warranted against defects in materials and/or workmanship for indicated warranty period.

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1. Warranty Period: Not less than one (1) year from Date of Substantial Completion.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Overhead coiling doors shall be the product of The Cookson Co., Phoenix, AZ; [www.cooksondoor.com](http://www.cooksondoor.com) specified as the type, size, function, and quality of the products required.
  1. Exterior Type – Face-of-Wall Mounted: Cookson High Cycle - Motor (Gearhead - Horizontal) Operated Insulated Service Door.
- B. Products of the following manufacturers are acceptable, providing their products equal or exceed the quality specified, and they can provide products of the type, size, function, and arrangement required.
  1. Cornell Ironworks, Mountaintop, PA; [www.cornelliron.com](http://www.cornelliron.com).
  2. Kinneer Division of Wayne-Dalton, Columbus, OH; [www.wayne-dalton.com](http://www.wayne-dalton.com).
  3. North American Door, Division of Wayne-Dalton Door Inc., Lindenhurst, NY; [www.wayne-dalton.com](http://www.wayne-dalton.com).

### 2.2 MATERIALS AND CONSTRUCTION

- A. Door Curtain: Constructed of interconnected galvanized strip steel slats conforming to ASTM A526. Slats shall be 3 inches high by 7/8 inch deep consisting of a 22 gauge exterior slat and a 22 gauge interior slat separated by 13/16 inch of rigid insulation. Curtain insulation shall not produce a flame spread rating greater than 25 and a smoke generation greater than 50, with ColorCote finish.
- B. Bottom Bar: Consist of two, 1/8 inch steel angles mechanically joined together and shall include the Cookson Phantom Featheredge cordless safety edge system, with ColorCote finish.
- C. Guides: Constructed of 3 steel angles bolted together with 3/8 inch fasteners to form a channel for the curtain to travel. Extruded vinyl snap-on weatherstripping shall be furnished continuously along the exterior leg of each guide. The wall angle portion shall be continuous and fastened to the surrounding structure with either minimum 1/2 inch fasteners or welds, both on 36 inch centers, with ColorCote finish.
- D. Brackets: Constructed of steel not less than 1/4 inch thick and shall be bolted to the wall angle with minimum 1/2 inch fasteners, with ColorCote finish.
- E. Barrel: Steel tubing of not less than 6 inches in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain.

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1. Barrel shall be designed to limit the maximum deflection to 0.03 inch per foot of opening width. The springs shall be adjusted by means of an exterior wheel, with ColorCote finish.
- F. Hood: Fabricated from 24 gauge galvanized steel and shall be formed to fit the curvature of the brackets. The hood shall contain a waterproof baffle to control air infiltration. The hood shall be corrugated every 1 inch along the curvature for the entire length of the hood, with ColorCote finish.
- G. Provide full weather-stripping on the two jamb sides and across the top of each exterior door.

## 2.3 OPERATION

- A. Door shall be operated at a speed of 2/3 foot per second by an open drip-proof electric motor with gear reducer in oil bath. Motor operator shall include a geared limit switch, and an electrically interlocked emergency chain operator. Motor starter shall be housed in a NEMA 1 housing and include a magnetic reversing starter size 0, a 24 volt control transformer, and complete terminal strip to facilitate field wiring. Motor operator shall be activated by a 3 button push-button station in a NEMA 1 enclosure. Motor shall be sized as required by the door, 208 volts, three phase. Motor operator shall be mounted to the door bracket. All motor operators shall be U.L. listed. Horsepower shall be as recommended by the manufacturer for the sizes of doors required.
- B. Service doors shall include the rolling door safety edge system and shall include the following features:
  1. Shall be installed on the bottom bar of the door and shall automatically reverse the door if the device detects an obstruction in the downward travel of the door.
  2. Shall consist of a rubber boot attached below the bottom bar with an electrical switch secured to the back of the bottom bar. Shall operate with air wave technology and shall not rely on pneumatic pressure or electrical strip contacts to operate properly. Shall create an air wave that shall be detected and reverse the direction of the rolling door.
  3. The operation of the safety edge shall not be subject to interference's by temperature, barometric pressure, water infiltration, or cuts in the rubber boot.
  4. Safety edge system shall not have any external wires or cords from the motor to the bottom bar.
- C. Mount motor horizontally for minimal headroom requirements.

## 2.3 LOCKING MECHANISMS

- A. Locking Mechanisms: The overhead coiling fire doors shall be secured by means of a cylinder lock keyed to the building master keying system.

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## 2.4 FINISHES

- A. Finishes: Provide Cookson ColorCote finish system consisting of the following:
  - 1. Hot dipped galvanized G-90 coating consistent with ASTM A-525
  - 2. Bonderized coating for prime coat adhesion
  - 3. Factory applied Thermosetting Powder Coating applied with minimum thickness of 2.5 mils.
  - 4. Architect shall have a minimum of 180 standard colors to choose from. Submit samples for Architect's selection.
  - 5. Finish shall be semi-gloss.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Doors shall be erected by the manufacturer or his authorized representative in compliance with detailed instructions of the manufacturer.
- B. Install assemblies to provide a rigid, permanent attachment to the building according to supplier's instructions, approved shop drawings, and Architect's drawings.
- C. Provide all items and accessories as required for a complete and operating installation in every respect.

### 3.2 ADJUSTMENT AND CLEANING

- A. After installation, moving parts shall be properly adjusted to give free, effortless operation.
- B. Protect doors, as recommended by coiling door manufacturer to ensure that doors will be without damage or deterioration at Date of Substantial Completion.
  - 1. Take every precaution to properly protect the assemblies during and after installation.
- C. After installation clean exposed surfaces and demonstrate to the Architect that components are in proper working order.

END OF SECTION 08 33 23

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SECTION 08 51 13  
ALUMINUM WINDOWS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes heavy commercial-grade aluminum window units of the performance class indicated. Window types required include:

1. Fixed windows

### 1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide aluminum window units complying with performance requirements specified, as demonstrated by testing manufacturer's corresponding stock systems according to test methods indicated.

1. The Owner may have the finished assemblies tested at the completion of installation and the Contractor shall be responsible for correction of all deficiencies noted.

B. Design Requirements: Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA HC 60 for type, grade, and performance class of window units required.

C. Window systems shall be designed to meet wind-loading requirements of the 2007 Florida Building Code with the 2009 Supplement. Refer to Structural Drawings for wind velocity.

1. Window Assembly Labeling: Each window assembly shall be tested by an approved independent testing laboratory and have an "approved product label" affixed to the assembly per FBC Chapter 17.
2. Window assemblies shall resist the cyclic pressures, static pressures and missile impact loads as detailed in Florida Building Code test protocols TAS 201, TAS 202 and TAS 203.
3. Window assemblies in designated EHPA areas are to meet resistance to penetration by flying missiles per SSTD 12, latest edition

D. Testing: Test each type and size of required window unit through a recognized independent testing laboratory or agency, in accordance with ASTM E 330 for structural performance, with ASTM E 283 for air infiltration, and with both ASTM E 331 and ASTM E 547 for water penetration. Provide certified test results, complying with the provisions of the latest editions of the referenced standards.

1. Structural Performance: Provide window units with no failure or permanent deflection in excess of 0.4 percent of any member's span after removal of the imposed load, for a positive (inward) and negative (outward) test pressure of 75 lbf/sq. ft.
2. Air Infiltration: Provide units with air infiltration rate of not more than 0.06 cfm/ft. of operable sash joint for an inward test pressure of 6.24 lbf/sq. ft.
3. Water Penetration: Provide units with no water penetration as defined in the test method at an inward test pressure of 15 percent of the design pressure.

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4. Condensation Resistance: Provide units that have been tested for thermal performance in accordance with AAMA 1503.1, latest edition, showing a condensation resistance factor (CRF) of not less than 50.
5. Thermal Transmittance: Provide window units that have a U-value maximum of 0.69 BTU/hour/sq. ft./deg F at 15-mph exterior wind velocity, when tested in accordance with AAMA 1503.1, latest edition.

## 1.3 SUBMITTALS

- A. Submit the following in accordance with Division 1 requirements.
  1. Submit copies of product data for each type of window required, including:
    - a. Construction details and fabrication methods.
    - b. Profiles and dimensions of individual components.
    - c. Data on hardware, accessories, and finishes.
    - d. Recommendations for maintenance and cleaning of exterior surfaces.
  2. Shop drawings for each type of window required. Include information not fully detailed in manufacturer's standard product data and the following:
    - a. Layout and installation details, including anchors.
    - b. Elevations of continuous work at 1/4-inch scale and typical window unit elevations at 3/4-inch scale.
    - c. Full-size section details of typical composite members, including reinforcement.
    - d. Hardware including operators.
    - e. Glazing details.
    - f. Accessories.
    - g. Shop drawings shall be signed and sealed by a licensed engineer registered in the State of Florida.
    - h. Calculations for wind load design shall be stamped, sealed and signed by a Professional Engineer in the State of Florida verifying compliance with ASCE/SEI 7, latest edition.
    - i. Sample of Approved Product Label and location of attachment to assembly.
    - j. Submit current Miami-Dade NOA for all exterior window units.
- B. Submit warranty as specified herein.
- C. Submit proof of compliance with AAMA HC-60 requirements. Testing for this requirement shall be by an independent testing laboratory conducted within 5 years from the date of the submittal. Test must be for a window or windows larger than those required for this project. Non-current tests and inappropriate sizes will be cause for rejection.
- D. Pre-Installation Conference notes.

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## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- B. Standards: Requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA 101 and applicable general recommendations published by AAMA.
- C. Single-Source Responsibility: Provide aluminum window units from one source and produced by a single manufacturer.
- D. Pre-Installation Conference: Conduct a pre-installation conference at the project site prior to ordering and installation of the aluminum windows. Coordinate shop drawings, details, and delivery dates with all contractors.

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
  - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of window units.

## 1.6 WARRANTY

- A. Aluminum Window Warranty: Written warranty, executed by the window manufacturer, agreeing to repair or replace window units that fail in materials or workmanship within the specified warranty period. Failures include but are not necessarily limited to:
  - 1. Structural failures including excessive deflection, excessive leakage, or air infiltration.
  - 2. Faulty operation of sash and hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: 5 years from the Date of Substantial Completion.

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## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Products of the following manufacturers are acceptable, providing their products equal or exceed the quality specified; and they can provide products of the type, size, function, and arrangement required.
  - 1. Superior Window Corporation, Hialeah, Florida
  - 2. Peerless Windows, Fort Scott, Kansas
  - 3. EFCO, Monett, Missouri
  - 4. Traco, Cranberry Township, Pennsylvania

### 2.2 MATERIALS

- A. Aluminum Extrusions: Provide alloy and temper recommended by the window manufacturer for the strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than .125 inch thick minimum at any location for main frame and sash members, and .125 inch thick for all reinforcement members.
- B. Window Frames: Extruded aluminum with integral structural polyurethane thermal break in the frame members; equal-leg frame; finish factory-applied; frames factory-assembled.
- C. Fasteners: Provide nonmagnetic stainless steel screws.
  - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads.
  - 2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use torx pinned head fasteners.
- D. Anchors, Clips, and Window Accessories: Fabricate of aluminum or nonmagnetic stainless steel, complying with the requirements of ASTM B 633; provide sufficient strength to withstand design pressures.
- E. Sealant: For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating.
- F. Weatherstrip: Secured in extruded ports; double rows on sash perimeters: rigid PVC weatherseal in one side of the horizontal sash rails, and pile conforming to AAMA 701-92 with polypropylene center fin in remaining locations.

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## 2.3 ACCESSORIES

- A. Provide the manufacturer's standard accessories that comply with specified requirements.
- B. Structural mullions.
  - 1. Integral mullions (side stack): use where loading will permit.
- C. Provide all receptors, sill flashing (.062"), and head flashings at all windows as required to provide a watertight installation.

## 2.5 FABRICATION

- A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
- B. Pre-Glazed Fabrication: Comply with glass and glazing requirements of Section 08 81 00 – Glazing, AAMA 101 and wind loading requirements.
- C. Mullions: Integral mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, in the manner indicated.
- D. Frame shall be mechanically joined and reinforced at all corners. All corners shall be mitered.
- E. Operable vents shall be tubular members with mitered corners, gusset reinforced and crimped.
- F. All frame and vent joints shall be factory sealed with sealant conforming to AAMA 800.
- G. Water Control: compression gaskets on vent interior shall utilize pressure equalization and shall allow water to drain by gravity.
- H. Drip caps shall be field mounted on frame exteriors above all vent heads. Finish shall match window finish.

## 2.6 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Clear anodized finish conforming to AAM10C22A44 Class I, .7 mils thick.

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## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
  - 1. Verify cleaning of masonry is complete prior to installation of aluminum windows.
- B. Verify that rough or masonry opening is correct and the sill plate is level.

### 3.2 INSTALLATION

- A. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division 7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
  - 1. Compounds, joint fillers, and gaskets to be installed after installation of window units are specified as work in another section in Division 7.
- B. Provide all items as required for a complete and watertight installation in every respect, whether or not indicated on the drawings or specifications. Provide all miscellaneous accessories and trim and panning flashing as required whether or not indicated on the drawings or specified herein.
- C. All installed windows shall be weather and watertight in every respect.
- D. Erection Tolerance: Maximum variation from plumb is 1/16-inch in 3'-0 non-cumulative or 1/8-inch in 10'-0, which ever is less.

### 3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.
- B. Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- C. Clean glass of pre-glazed units promptly after installation of windows. Comply with requirements of the "Glass and Glazing" section for cleaning and maintenance.
- D. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 51 13

# Downtown Bradenton Transit Station

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SECTION 08 51 15  
PASS THROUGH WINDOWS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for the complete installation of pass through windows as specified herein and as indicated on the drawings.
- B. Section includes:
  - 1. Pass through window

### 1.2 SUBMITTALS

- A. Submit the following in accordance with Division 01 requirements.
  - 1. Product data, including:
    - a. Construction details and fabrication methods
    - b. Profiles and dimensions of individual components
    - c. Data on hardware, accessories, and finishes
    - d. Recommendations for maintenance and cleaning of exterior surfaces
  - 2. Shop drawings: Include information not fully detailed in manufacturer's standard product data and the following:
    - a. Layout and installation details, including anchors
    - b. Typical window unit elevations at 3/4-inch scale.
    - c. Full-size section details of typical composite members, including reinforcement
    - d. Hardware including operators
    - e. Glazing details
    - f. Accessories
- B. Submit warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installation of pass through windows similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.

### 1.4 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

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## 1.5 WARRANTY

- A. Submit a written warranty, agreeing to repair or replace window units that fail in materials or workmanship within the specified warranty period. Failures include but are not limited to:
  - 1. Structural failures including excessive deflection, excessive leakage, or air infiltration.
  - 2. Faulty operation of sash and hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: Five (5) years from the Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Model # XW 6036 by Creative Industries, Inc., Indianapolis, Indiana.
- B. Products of the following companies are also acceptable provided compliance with all technical requirements as specified herein:
  - 1. Nissen & Company, Inc., South El Monte, California.

### 2.2 PRODUCTS/MATERIALS

- A. Aluminum Extrusions: Provide alloy and temper recommended by the window manufacturer for the strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.062 inch thick.
- B. Provide with stainless steel deal tray and amplified talk through device.
- C. Glass
  - 1. 1" glass-clad polycarbonate detention glazing. Clear.

### 2.3 HARDWARE

- A. Manufacturer's standard for unit provided including deal tray closure and draft free talk-through.

### 2.4 FABRICATION

- A. Pre-glazed Fabrication: Pre-glaze window units at the factory with the specified laminated glazing herein.
- B. All frame and vent joints shall be factory sealed with sealant conforming to AAMA 800.

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- C. Water Control: compression gaskets on vent interior shall utilize pressure equalization and shall allow water to drain by gravity.

## 2.5 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes. Apply on clean extrusions free from surface blemishes or scratches.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. AAMA 607 clear anodized finish conforming to AAM10C22A41 Class I, .7 mils thick.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect openings before beginning installation. Verify that rough or masonry opening is correct and the sill plate is level.

### 3.2 INSTALLATION

- A. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division 7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
  - 1. Compounds, joint fillers, and gaskets to be installed after installation of window units are specified as work in another section in Division 7.
- B. Provide all items and accessories as required for a complete and watertight installation in every respect, whether or not indicated on the drawings or specifications. Provide all miscellaneous accessories and trim and panning flashing as required whether or not indicated on the drawings or specified herein.
- C. All installed windows shall be weather and watertight in every respect.
- D. Install per manufacturer's recommendations.
  - 1. Compounds, joint fillers, and gaskets to be installed after installation of window units are specified as work in another section in Division 7.

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## 3.3 CLEANING

- A. Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of preglazed units promptly after installation of windows.

## 3.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 51 15

# Downtown Bradenton Transit Station

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## SECTION 08 71 00 - FINISH HARDWARE

### PART I - GENERAL

#### 1.01 WORK INCLUDED

- A. The work in this section shall include furnishing of all items of finish hardware as hereinafter specified or obviously necessary to complete the building, except those items that are specifically excluded from this section of the specification.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Hollow Metal Doors and Frames
- B. Aluminum Doors and Frames
- C. Wood Doors and Frames

#### 1.03 DESCRIPTION OF WORK

- A. Furnish labor and material to complete hardware work indicated, as specified herein, or as may be required by actual conditions at building.
- B. Include all necessary screws, bolts, expansion shields, other devices, if necessary, as required for proper hardware application. The hardware supplier shall assume all responsibility for correct quantities.
- C. Hardware shall meet the requirements of Federal, State and Local codes having jurisdiction over this project, notwithstanding any real or apparent conflict therewith in these specifications.
- D. Fire-rated openings:
  - 1. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, UBC 702 (1997) and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
  - 2. Panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating "Fire Exit Hardware".
- E. Hurricane Openings
  - 1. Provide hardware for hurricane openings in compliance with local jurisdiction. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by local authority for the types and sizes of doors required, and complies with the requirements of the door and door frame.
- F. Fasteners:
  - 1. Hardware as furnished shall conform to published templates generally prepared for machine screw installation.
  - 2. Furnish each item complete with all screws required for installation. Typically, all exposed screws installation.
  - 3. Insofar as practical, furnished concealed type fasteners for hardware units that have exposed screws shall be furnished with Phillips flat head screws, finished to match adjacent hardware.
  - 4. Door closers and exit devices to be installed with closed head through bolts (sex bolts).

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## 1.04 QUALITY ASSURANCE

- A. The supplier to be a directly franchised distributor of the products to be furnished and have in their employ an AHC (Architectural Hardware Consultant). This person is to be available for consultation to the architect, owner and the general contractor at reasonable times during the course of work.
- B. The finish hardware supplier shall prepare and submit to the architect six (6) copies of a complete schedule identifying each door and each set number, following the numbering system and not creating any separate system himself. He shall submit the schedule for review, make corrections as directed and resubmit the corrected schedule for final approval. Approval of schedule will not relieve Contractor of the responsibility for furnishing all necessary hardware, including the responsibility for furnishing correct quantities.
- C. No manufacturing orders shall be placed until detailed schedule has been submitted to the architect and written approval received.
- D. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting, finishing hardware setting. Furnish templates in ample time to facilitate progress of work.
- E. Hardware supplier shall have an office and warehouse facilities to accommodate the materials used on this project. The supplier must be an authorized distributor of the products specified.
- F. The hardware manufactures are to supply both a pre-installation class as well as a post-installation walk-thru. This is to insure proper installation and provide for any adjustments or replacements of hardware as required.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Wrap, protect finishing hardware items for shipment. Deliver to manufacturing contractors hardware items required by them for their application; deliver balance of hardware to job; store in designated location. Each item shall be clearly marked with its intended location.

## 1.06 WARRANTY

- A. The material furnished shall be warranted for one year after installation or longer as the individual manufacturer's warranty permits.
- B. Overhead door closers shall be warranted in writing by the manufacturer against failure due to defective materials and workmanship for a period of ten (10) years commencing on the Date of Final Completion and Acceptance, and in the event of failure, the manufacture is to promptly repair or replace the defective with no additional cost to the Owner.

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## PART II - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. To the greatest extent possible, obtain each kind of hardware from only one manufacturer.
- B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	ACCEPTABLE MANUFACTURER	ACCEPTABLE SUBSTITUTE
1) Hinges	Ives	Hager, Stanley , Bommer
2) Locks & Latches	Schlage	None (Owners standard)
3) Cylinders, Keys, Keying	Schlage Everest	None (Owners standard)
4) Exit Devices	Von Duprin	None (Owners standard)
5) Door Closers	LCN	None (Owners standard)
6) OH Stops/holders	Glynn Johnson	Rixson
7) Magnetic Hold Opens	LCN	Dor-O-Matic
8) Wall Stops/Floor Stops, Flushbolts	Ives	Rockwood, G J
9) Kick Plates	Ives	Quality, Rockwood
10) Threshold/Weather-strip	National Guard	Pemko, Zero
11) Silencers	Ives	Rockwood, GJ
12) Key Cabinet	Lund	Key Control

- C. If material manufactured by other than that specified or listed herewith as an equal, is to be bid upon, permission must be requested from the architect seven (7) days prior to bidding. If substitution is allowed, it will be so noted by addendum.

### 2.02 FINISH OF HARDWARE:

- A. Exterior Hinges to be Stainless Steel (32D), Interior Hinges to be Satin Chrome (26D). Door Closers to be Aluminum. Locks to be Satin Chrome (26D), Exit Devices to be Satin Chrome (26D). Overhead Holders to be Satin Chrome (26D), Flat Goods to be Satin Chrome (26D) or Stainless Steel (32D) and the Thresholds to be Mill Finish Aluminum.

### 2.03 HINGES AND PIVOTS:

- A. Exterior butts shall be Stainless Steel. Butts on all out swinging doors shall be furnished with non-removable pins (NRP).
- B. Interior butts shall be as listed.
- C. Doors 5' or less in height shall have two (2) butts. Furnish one (1) additional butt for each 2'6" in height or fraction thereof. Dutch door shall have two (2) butts per leaf.

### 2.04 KEYING:

- A. All locks and cylinders shall be Schlage Everest key system, all bittings shall be issued by Schlage Lock.
- B. Provide Two (2) each change keys per lock and Six (6) each grand master and master keys. All keys to be Patent Restricted.

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- C. Hardware supplier to provide temporary cylinders or cores during the construction phase. The contractor is to change out the temporary cylinders for the permanent cylinders.

## 2.05 LOCKSETS:

- A. Locksets shall be Heavy Duty Cylindrical type, unless specified otherwise, in "ND" series and "AL", design as manufactured by Schlage.

### 1. Acceptable substitutions:

- A. None (Owners standard)

## 2.06 EXIT DEVICES:

- A. All devices shall be Von Duprin 98 Series in types and functions specified. All devices must be listed under "Panic Hardware" in accident equipment list of Underwriters Laboratories. All labeled doors with "Fire Exit Hardware" must have labels attached and be in strict accordance with Underwriters Laboratories.
- B. All exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles must be provided.
- C. All surface strikes shall be roller type and come complete with a plate underneath to prevent movement. And shall be provided with a dead-latching feature to prevent latchbolt tampering.

### 1. Acceptable substitutions:

- A. None (Owners standard)

## 2.07 DOOR CLOSERS:

- A. All closers shall be LCN 4000 series having non-ferrous covers, forged steel arms separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be furnished with parallel arm mounted on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated.
- B. Door closer cylinders shall be of high strength cast iron construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
- C. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C.

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- D. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.
  - 1. Acceptable substitutions:
    - A. None (Owners standard)

## 2.08 TRIM AND PLATES:

- A. Kick plates, mop plates, and armor plates, shall be .050 gauge with 630 finish. Kick plates to be 10" high, mop plates to be 4" high. All plates shall be two (2) inches less full width of door.
- B. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

## 2.09 DOOR STOPS:

- A. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to IVES 407 Series are preferred, but where not practical furnish floor stops equal to IVES 436 or 438 series. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series.

## 2.10 THRESHOLDS AND WEATHERSTRIP:

- A. Thresholds and weather-strip shall be as listed in the hardware schedule.

## 2.11 DOOR SILENCERS:

- A. Furnish rubber door silencers equal to IVES 20 for all new interior hollow metal frames, (2) per pair and (3) per single door frame.

## PART III - EXECUTION

### 3.01 INSTALLATION:

- A. All hardware shall be applied and installed in accordance with the Finish Hardware schedule. Care shall be exercised not to mar or damage adjacent work.
- B. Contractor to provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses both before and after installation.
- C. No hardware is to be installed until the hardware manufactures have provided a pre-installation class. To insure proper installation of the specified products a post-installation inspection is to be conducted.

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## 3.02 ADJUSTING AND CLEANING:

- A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning project to owner, contractor shall clean and make any final adjustments to the finish hardware.

## 3.03 PROTECTION:

- A. Contractor shall protect the hardware, as it is stored on construction site in a covered and dry place.
- B. Contractor shall protect exposed hardware installed on doors during the construction phase.

## 3.04 KEY CABINET:

- A. Set up and index one (1) Key Cabinet that allows room for expansion for 150% of the number of keys for the project.

## 3.05 HARDWARE SCHEDULE:

- A. The following schedule is furnished for whatever assistance it may afford the contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors or for each single door.
- B. This hardware schedule was prepared by.

IR - Security Technology  
735 W. SR 434, Suite H  
Longwood, FL 32750  
Ph: 407-571-2000  
Fax 407-571-2006

### Hardware Group No. 01 - Door 102

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3	EA HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA OFFICE LOCK	ND53BDC RHO	626	SCH
1	EA SFIC EV B CORE ONLY	80-036	626	SCH
1	EA SURFACE CLOSER	4041	689	LCN
1	EA KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA SWEEP	339AA	AL	ZER
1	SET SEALS	188S	BRN	ZER
1	EA THRESHOLD	544A	AL	ZER

### Hardware Group No. 02 - Door 104

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3	EA HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	EA OFFICE LOCK	ND53BDC RHO	626	SCH
1	EA SFIC EV B CORE ONLY	80-036	626	SCH
1	EA SURFACE CLOSER	4041 CUSH	689	LCN

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1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	188S	BRN	ZER
1	EA	THRESHOLD	65A	AL	ZER

Hardware Group No. 03 – Door 102A

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	3PB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	STOREROOM LOCK	AL80TD SAT	626	SCH
1	EA	SFIC EV B CORE ONLY	80-036	626	SCH
2	EA	WALL STOP	WS407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
1	EA	METAL Z-ASTRAGAL	BY DOOR SUPPLIER	GRY	B/O

END OF SECTION

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**Division 09**  
Finishes



# Downtown Bradenton Transit Station

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SECTION 09 30 00  
TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes:
  - 1. Floor and wall tiles
  - 2. Setting materials.
  - 3. Ceramic tile accessories.

### 1.2 SUBMITTALS

- A. One copy of manufacturer's prepared sample board showing actual piece of each available variety of each required tile type and 2 copies of printed type facsimiles (such as page from full color product catalog) of each piece.
- B. Manufacturer's published complete product data for each required grout type along with 3 copies of chart showing available grout colors.
  - 1. Include maintenance instructions
- C. Pre-Installation Conference notes
- D. Mock-up.

### 1.3 QUALITY ASSURANCE

- A. Work done under this Section of the Specifications shall be performed by mechanics skilled and experienced in the class of Work involved. Workmanship shall be in accordance with best trade practices, and surface shall be true to line and free from waves and other imperfections. Joints between tiles shall be maintained uniform and even and properly grouted.
- B. Pre-Installation Conference: Convene one week prior to commencing work of this section, under provisions of Section 01 31 19.
- C. Mock-up:
  - 1. Provide mockup of tile under provisions of Section 01 45 00.
  - 2. Construct mockup, 4 feet long by 4 feet wide, with waterproofing, finish grout and specified accessories.
  - 3. Locate where directed.
  - 4. Mockup may remain as part of the work.

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## 1.4 PROJECT COLORS AND PATTERNS

- A. Colors, surface textures, and other appearance characteristics shall be as indicated on herein:

CT1: blanc linen (fabrique collection)  
CT2: gris linen (fabrique collection)  
CT3: crème linen (fabrique collection)  
CT4: soleil linen (fabrique collection)  
CT5: arctic white glazed porcelain  
CT6: arctic white semi-gloss porcelain

## 1.5 EXTRA STOCK

- A. Deliver tile, consisting of not less than 2 percent of the total quantity of each type, size, pattern, and color installed, to the Owner. Furnish tile in original boxes, properly marked.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products of the following manufacturers will be acceptable, providing their products equal or exceed the type and quality of the specified products, and meet the other specification requirements.

- B. Manufacturers:

1. American Olean Tile Co. Inc., Lansdale, Pennsylvania
2. Summitville Tiles, Inc., Summitville, Ohio
3. Basis of Design: DalTile Corporation, Dallas, Texas
4. Metropolitan Ceramics, Canton, Ohio
5. United States Ceramics, East Sparta, Ohio
6. Interceramic Tile Company, Garland, Texas
7. Lonestar Mosaics, Dallas, Texas

- C. Manufacturers of mortars and grouts

1. Basis of Design: Custom Building Products
2. American Olean Tile Co., Inc.
3. TEC a division of H. B. Fuller Co.
4. H. B. Fuller Co.
5. Laticrete International, Inc.
6. Summitville Tiles, Inc.
7. Upco Co. Div., Emhart Corp.

- D. Ceramic tile accessories

1. Schluter-Systems, Plattsburgh, New York.
2. Ceramic Tool Company, Waukesha, Wisconsin

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## 2.2 CERAMIC WALL TILE

- A. Provide standard grade ceramic glazed wall tile conforming to ANSI 137.1 (latest edition).
  - 1. Provide sizes and indicated on the drawings wall tile by 5/16" thick matte glazed tile with cushion edge.
  - 2. Use master set, back mounted sheets.
  - 3. Colors: as indicated on the drawings.
- B. Glazed Wall Tile Trim
  - 1. Furnish size, color, and shade to as selected by Architect
  - 2. Provide bullnose wainscot cap where required
  - 3. Provide square top, set-on type, cove base at other floors
  - 4. Provide square edges at inside corners
  - 5. Provide bullnose edges at outside corners and jambs
  - 6. See Drawings for locations and patterns

## 2.3 CERAMIC FLOOR TILE

- A. Provide Standard Grade ceramic mosaics conforming to ANSI 137.1 (latest revision).
- B. Provide size as indicated on the drawings by 1/4 inch thick porcelain type with all-purpose edges and patterns to be selected by Architect as follows:
  - 1. Color: as indicated on the drawings.
- C. Ceramic Mosaic Trim
  - 1. Provide bullnose trim at base and wainscot caps, curbs, and outside corners.
  - 2. Provide coves at bases, including corners.
  - 3. See Drawings for locations and patterns.

## 2.4 SETTING MATERIALS

- A. Latex-Portland Cement Mortar: ANSI A118.4.
- B. Water: Clean and drinkable.
- C. Dry-Set Mortars: ANSI 118.1A.

## 2.5 GROUTING MATERIALS

- A. One hundred percent solids epoxy grout, complying with ANSI A118.3.
- B. Colors: as indicated on the drawings.

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- C. Epoxy grout is required at all locations.

## 2.6 MISCELLANEOUS MATERIAL

- A. Latex Underlayment: Quick set type, as recommended by membrane manufacturer, as required to provide positive drainage to floor drains.
- B. Ceramic Tile Accessories
  - 1. "Schluter-SCHIENE", aluminum, tile termination strip. Use at all edges adjacent to different flooring materials. Height shall match adjacent flooring materials.
  - 2. "Schluter-RENO", aluminum, stepless termination strip. Use at all edges where the tile is higher than the adjoining different floor materials.
- C. Expansion Joints
  - 1. If not indicated on the Drawings, expansion joints shall be installed in accordance with the Tile Council of America, Inc., Handbook for Ceramic Tile Installation, latest edition, as follows:
    - a. Interior: 24' to 36' in each direction.
    - b. Exterior: 12' to 16' in each direction.
    - c. Interior tilework exposed to direct sunlight or moisture: 12' to 16' in each direction.
    - d. Where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials.
    - e. All expansion, control, construction, cold and seismic joints in the structure shall continue through the tilework including such joints at vertical surfaces.
    - f. Joints through tilework directly over structural joints shall never be narrower than the structural joint.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Prior to installing tile, inspect surfaces to receive tile. Do not proceed with installation until such defects or conditions have been corrected.
  - 1. Verify walls have no efflorescence.
- B. The starting of installation in a room or space shall imply acceptance of the surfaces to receive the tile in that space.

### 3.2 LAYOUT

- A. Determine locations of movement joints before starting tilework.
- B. Lay out tile work so as to minimize cuts less than one-half tile in size.

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- C. Locate cuts in both walls and floors so as to be least conspicuous.
- D. Lay out tile wainscots to next full tile beyond dimensions shown.
- E. Align wall joints to give straight, uniform grout lines, plumb and level.
- F. Align floor joints to give straight uniform grout lines parallel with walls.

## 3.3 WORKMANSHIP

- A. Supply first-class Workmanship in tile work.
- B. Use products in strict accordance with recommendations and directions of manufacturer.
- C. Proportion mixes in accordance with latest ANSI standard specifications.
- D. Smooth exposed cut edges.
- E. Be sure cut edges are clean before installing tiles.
- F. Fit tile carefully against trim and accessories, also around pipes, electrical boxes, and other built-in fixtures so that escutcheons, plates, and collars will completely overlap cut edges.
- G. When using glazed tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.
- H. Be sure tile Work is free of grout film upon completion.

## 3.4 SETTING METHODS

- A. Method and typical detailing for tile Work shall be in accordance with the following TCNA alphanumeric method, listing from the Tile Council of North America's Handbook for Ceramic Tile installation, 2009 edition.
- B. Concrete Subfloors
  - 1. New Slabs on Grade (Thin-Set Method): TCNA F113-07 dry-set mortar or latex portland cement mortar with Tile Installation Specification ANSI A108.5.
- C. Walls
  - 1. Masonry (Cement Mortar Bond Method): TCNA W211-07 cement mortar, bonded with Tile Installation Specification ANSI A108.1.
- D. Sound each tile after set. Replace all hollow sounding tile

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## 3.5 GROUTING

- A. Grouting shall be installed in accordance with ANSI A108.10 (A108.6 for epoxy) and the manufacturer's recommended procedures and precautions during application and cleaning.
  - 1. Floor application shall receive epoxy type grout and wall applications shall receive latex type grout.
- B. Rinse tile work thoroughly with clean water before and after using chemical cleaners.

## 3.6 PROTECTION

- A. Protect the tile against damage after installation. Damaged tile that appears in the finish work prior to turning the building over to the Owner is to be repaired or replaced without further cost to the Owner. Protect adjoining areas and surfaces.

END OF SECTION 09 30 00

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SECTION 09 51 00  
ACOUSTICAL CEILINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes acoustical ceilings and related items
- B. Review Reflected Ceiling Plans and Mechanical and Electrical Drawings for layout, and pattern of acoustical units, location of recessed light fixtures, ceiling diffusers and grilles, details of suspension system, details at change of level, details at ceiling penetrations, details of fire rated acoustical treatment, access doors, special edge treatment, and necessary connections to work of other trades.

### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's published data on lay-in ceiling panels, fasteners, and grid
  - 1. Manufacturer's published data on lay-in ceiling panels, fasteners, and grid
  - 2. Documentation from manufacturer stating 50% of the amount of post-consumer and post-industrial recycled content by weight for lay-in ceiling panels, fasteners, and grid
- B. Reflected ceiling plan coordination drawings:
  - 1. Ceiling suspension members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules.
  - 4. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinkler heads; and special moldings at walls, column penetrations, and other junctures with adjoining construction.
- C. Samples:
  - 1. Manufacturer's standard sample size for each panel type specified.
  - 2. Manufacturer's standard sample for grid showing all components in grid system.
- D. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.
- E. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that show compliance of acoustical ceiling system and components with building code in effect for Project.
- F. Product test reports from qualified independent testing laboratory that are based on its testing of current products for compliance of acoustical ceiling systems and components with requirements.
- G. Pre-installation conference minutes
- H. Sample warranty

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## 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has successfully completed acoustical ceilings similar in material, design, and extent to that indicated for Project.
- B. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling unit from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- C. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- D. Fire Performance Characteristics:
  - 1. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
    - a. Flame Spread: 25 or less.
    - b. Smoke Developed: 50 or less.
  - 2. Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
- E. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components, and partition system.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 01.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.
- D. Packages required under this Section shall be properly marked on the outside with the identification of the materials contained in the package, so that they may be readily identified with the location to be used.

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## 1.5 PROJECT CONDITIONS

- A. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

## 1.6 EXTRA MATERIALS

- A. **Maintenance Stock:** Under this Section furnish to the Owner prior to final acceptance, extra maintenance stock of acoustical materials, consisting of a minimum of one percent of area of each size, type, and thickness installed on the job. This extra stock is for the Owner's use after completion of the Project and is not to be used for repair or replacement required during the construction period or during the 60 day period following Substantial Completion. Properly package, seal, and identify extra stock material,
- B. **Replacement Stock:** In addition to the maintenance stock specified above, provide extra replacement stock of acoustical materials, consisting of a minimum of one percent of area of each size, type and thickness installed on the job. This extra stock is for replacement of damaged materials during the 60 day period following Substantial Completion, when the party responsible for the damage cannot be ascertained by the Owner's agent. Replacement stock that is not used shall be furnished to the Owner as maintenance stock.

## 1.7 WARRANTY

- A. **Acoustical Panel:** Submit a written warranty executed by the manufacturer agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include: sagging and warping, and rusting of the suspension system and components.
- B. **Warranty Periods:**
  - 1. Acoustical Panels: Ten (10) years from the Date of Substantial Completion.
  - 2. Grid: Ten (10) years from the Date of Substantial Completion.
  - 3. Acoustical panels and grid system provided by the same manufacturer shall be warranted for fifteen (15) years from the Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. **Basis of Design:** Armstrong World Industries, Lancaster, Pennsylvania
- B. Products of the following manufacturers are acceptable, providing their products equal or exceed the quality specified, and they can provide products of the type, size, function, and arrangement required.
  - 1. Certainteed Corporation (formerly Celotex), Valley Forge, Pennsylvania
  - 2. USG Interiors Inc, Chicago, Illinois

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## 2.2 MATERIALS

- A. Acoustical Ceiling Tile: Shall meet Federal Specifications SS-S-118B, Class A flame spread 25, and carry UL label. Tile shall carry the humidity resistant HumiGuard Plus performance characteristics. Finish shall be factory applied, washable, white latex paint, unless noted otherwise.
  - 1. Armstrong #1728, Fine Fissured, 24" x 24" x 5/8", square edge, white, NRC .055, CAC33, with anti-microbial, HumiGuard Plus.
- B. Standard for Acoustical Ceiling Units: ASTM E 1264 classifications as designated by reference to types, patterns, acoustical ratings, and light reflectance's, unless otherwise indicated.
  - 1. Colors and Patterns: Provide products to match appearance characteristics indicated under each product type.

## 2.3 CEILING SUSPENSION SYSTEMS

- A. Basis of Design: Armstrong World Industries, Lancaster, Pennsylvania.
  - 1. Chicago Metallic Corporation, Chicago, Illinois
  - 2. USG Interiors Inc, Chicago, Illinois
- B. Suspension systems shall meet or exceed the requirements of ASTM C 635 for dimensional tolerances, coatings and finishes, and load carrying capabilities. Individual component deflection shall not exceed 1/360 of the span.
- C. Finishes and Colors: Provide hot-dipped galvanized finish (G-30 minimum) on all ceiling suspension components. Exposed surfaces of suspension system components shall receive white baked-on enamel paint.
  - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
  - 2. Provide heavy duty suspension system suitable for severe environmental conditions, according to ASTM C635.
- D. Acoustical Lay-In System: Grid with 9/16" or 15/16" face. See Sheets I700-1 and I700-2.
- E. Provide hold down clips and edge clips within 4 feet of exterior openings.
- F. Wall channel: Hemmed edge type.
- G. Rough Suspension Materials
  - 1. Metal Channel Runners: 1-1/2", 475 pounds per thousand lineal feet and 3/4", 300 pounds, per thousand lineal feet, cold rolled painted channels.
  - 2. Hanger and Tie Wire: Not less than 12 gauge galvanized soft annealed steel.

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- H. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and structural framing to which ceiling system attaches. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
  - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Border to be 12 inches or greater, and comply with reflected ceiling plans.
- C. Laid out grid and coordinate for lighting fixtures and mechanical systems
- D. Application of acoustical treatment shall be done by the manufacturer of his authorized applicator and in strict accordance with the manufacturer's specifications, except as herein modified.
- E. The installation of the ceiling shall be done prior to the installation of shelving, built-in counters, and finished floors; but after the other work in the room has been completed, including painting.

### 3.3 INSTALLATION

- A. Install suspension wires 4 foot on center, maximum, in each direction. Secure suspension hangers to building structure above. For lighting fixtures, install hanger wires to runners at all 4 corners of fixtures. Do not attach hanger wire to metal deck, electrical equipment, mechanical equipment or related support systems.
  - 1. Maximum splay of hanger wire is 10 degrees and must be offset per ASTM C635.
  - 2. Suspension wires, straps, and chains shall not be attached to or through steel roof decks.
- B. Install metal channel by saddle tying hanger wire or with leveling clips to a leveling tolerance of 1/8" in 12 feet each way.
- C. Install grid suspension system in strict accordance with the manufacturer's recommendations.

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- D. Install wall angle at intersection of suspended ceiling and vertical surfaces. Where plenum space occurs above ceiling, apply continuous ribbon of acoustical adhesive or caulking compound on top of vertical wall angle after installation.
- E. Install acoustical units in a true and even plane, in straight line courses following lay out pattern shown in reflective ceiling plan. Fit border units neatly against vertical surfaces.
- F. Seal joints in acoustical units around pipes, ducts, and electrical outlets with caulking compound.
- G. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
  - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
  - 2. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
- H. Install acoustical tile in coordination with suspension system.
- I. Just prior to the Date of Substantial Completion, remove and replace skinned, damaged, or dirty tile with new.
- J. Provide all items and accessories as required for a complete installation in every respect.
- K. Install in strict accordance with the manufacturers written installation instructions.

## 3.4 CLEANING

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 00

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SECTION 09 65 63  
RUBBER TILE FLOORING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes rubber tile flooring.
- B. Rubber base.

### 1.2 SUBMITTALS

- A. Manufacturer's Product Data:
  - 1. Physical properties of flooring material and accessories
  - 2. Maintenance instructions
  - 3. Sample Warranty
- B. Samples: All available colors in thickness as specified.
- C. Manufacturer's recommendations for the correct preparation, finishing and testing of concrete sub-floor surface to receive rubber surface.
- D. Results of Bond and Moisture Tests.
- E. Certification by manufacturer that product complies with local regulations controlling VOCs.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall be approved by the manufacturer and have completed at least 3 projects of similar magnitude and complexity.
- B. Calcium Chloride Test: Contractor shall provide a calcium chloride test to measure moisture vapor emissions from the concrete slab on grade, prior to the installation of the resilient flooring. Maximum moisture emissions levels shall be as recommended by the resilient flooring manufacturer. Provide one test for every 2,000 square feet of floor area, or as otherwise recommended by the manufacturer.
- C. Bond and Moisture Tests: Contractor shall provide bond and moisture tests prior to the installation of the resilient flooring. Bond and moisture tests shall be in strict accordance with the resilient flooring manufacturer's recommendations. Provide amount of tests as recommended by the resilient flooring manufacturer.

### 1.2 DELIVERY, STORAGE, AND HANDLING

- A. Material shall not be delivered or installed until wet work is complete and room temperature can be maintained at least 55 degrees F and moisture content of concrete slab is 4 percent or lower.

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- B. Area where materials are to be stored will be maintained at 55 degrees F and be kept at under 50 percent relative humidity.

## 1.3 JOB CONDITIONS

- A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).
- B. Do not install rubber tile flooring until it is at the same temperature as the space where it is to be installed.
- C. Close spaces to traffic during rubber tile flooring installation.

## 1.4 SEQUENCING AND SCHEDULING

- A. Install rubber tile flooring and accessories after other finishing operations, including painting, have been completed.
- B. Do not install rubber tile flooring over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

## 1.5 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products and from the same lot, installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
  - 1. Furnish not less than 5% of total amount of rubber tile flooring installed.

## 1.8 WARRANTY

- A. Manufacturer's Warranty: Submit, for 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 Owner may have under Contract Documents.
  - 1. Warranty Period: Five (5) years from the Date of Substantial Completion.

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## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Johnsonite Roundel speckled rubber.
- B. Products of other manufacturers may be acceptable provided compliance with all technical requirements herein. Submit product data and request for product substitution to Architect within 10 days of bid due date. Additional manufacturers may be listed by Addendum.

### 2.2 MATERIALS

- A. Tile Dimensions: 24" x 24"
- B. Color: 587 Naples
- C. Tile Weight: 2.5 lbs/sq ft approximately
- D. Single-ply, non-laminated surface with high slip-resistance manufactured from recycled rubber.
- E. Product Testing:
  - 1. Tensile Strength, lb/in<sup>2</sup> (ASTM D412): 200 min.
  - 2. Flexibility, 1/4 inch mandrel (ASTM F137): pass
  - 3. Static Load, 400 lb/in<sup>2</sup> (ASTM F970): less than 0.005 in.
  - 4. Coefficient of Friction (ASTM 2047): greater than 0.9

### 2.3 RUBBER BASE

- A. Products of the following manufacturers will be acceptable, providing they equal or exceed the quality specified.
  - 1. Basis of Design: Johnsonite, Chagrin Falls, Ohio. Color:55 silver gray.
  - 2. Burke Mercer Flooring Products, San Jose, California
  - 3. Roppe Rubber Corporation, Fostoria, Ohio
  - 4. Flexco Co., Tuscumbia, Alabama
  - 5. Armstrong, Toledo, Ohio
  - 6. Mannington, Salem, New Jersey
- B. Rubber Cove Base: 4 inches in height by roll stock and 1/8 inch thick, ribbed back, rounded top, and set on type. (4 foot length base material is not acceptable.)
  - 2. Provide pre-molded corners 4 inches in height by 4 inches in length each way for external corners.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in strict accordance with the manufacturers written installation instructions.
- B. Prepare and inspect substrate prior to installation in strict accordance with written installation instructions by the manufacturer.
- C. Clean in strict accordance with the manufacturers written installation instructions.
- D. Protect recycled rubber flooring after installation prior to Date of Substantial Completion.
- E. Provide all items and accessories as required for a complete installation in every respect.

END OF SECTION 09 65 63

# Downtown Bradenton Transit Station

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SECTION 09 91 00  
PAINTING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete painting and finishing work as detailed on the Drawings and as specified herein, of surfaces as scheduled throughout the building.
- B. The type of material to be used and the number of coats to be applied are listed in the "Painting Schedule" in Part 3 of this Section. Also, refer to Room Finish Schedule and Finish Plans.
- C. The term "paint" as used herein, includes enamels, paints, sealers, stains, fillers, emulsions, and other coatings, whether used as prime, intermediate, or finish coats.
- D. The Architect shall not be limited in the number of colors selected for single space or for the complete Project.
- E. The intent is to provide a finished building, interior and exterior, whether or not specifically indicated. Some items may not be specifically indicated to be painted, however, all items shall be finished as directed by the Architect.

### 1.2 SUBMITTALS

- A. Materials List: Prior to the start of work and before paint materials are delivered to the site, submit a list of materials proposed and the equivalent specified item proposed.
  - 1. This shall in no way be construed as permitting substitution of materials for those specified or approved for this Work by the Architect.
- B. Color Chip Catalog: Provide a current color chip catalog from which colors may be selected. Manufacturers may fulfill this requirement by updating that Architect's office catalog.
- C. Stain Samples: Submit sample of specified wood species with selected stain applied to specified wood types to Architect for approval. Resubmit additional samples as necessary to obtain color desired by Architect.
- D. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable manufacturer, submit for review the current recommended method of application published by the manufacturer.
- E. Certification: Submit written certification from each coating manufacturer attesting that coatings provided under this specification section are specifically formulated and manufactured for the environmental conditions encountered in the State of Florida subtropical regions including factory mixed mildewcides and fungicides of type and quantity to inhibit fungus and mildew growth. Further certify that mildewcides and fungicides do not contain compounds of mercury, lead or other heavy metals.

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- F. Material Safety Data Sheets: Submit Material Safety Data Sheets (MSDS) for each coating product. In hazardous ingredient section of the MSDS form, write in type and quantity of mildewcide incorporated in the coating specified.

## 1.3 QUALITY ASSURANCE

- A. **Qualifications of Painters:** Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. If installed painting is rejected, no allowance will be made for lack of mechanics skill.
- B. **Codes and Standards:** In addition to complying with pertinent codes and regulations, comply with "Standard (Type 1)" as defined by the Painting and Decorating Contractors of America in their "Modern Guide to Paint Specifications," current edition.

## 1.4 FIELD QUALITY CONTROL

- A. **Painting Contractor** shall completely paint and finish one complete room according to the Specifications, as designated by Architect, which will be used as quality standard for remainder of Project.

## 1.5 PRODUCT HANDLING

- A. **Delivery:** Deliver paint materials to the job site in their original unopened containers with labels intact and legible at time of use.
- B. **Protection**
  - 1. Store only the approved materials at the job site and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
  - 2. Use means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.
  - 3. Use means necessary to protect paint materials before, during, and after application and to protect the installed work and materials of other trades.

## 1.6 EXTRA STOCK

- A. Upon completion of this portion of the Work, deliver to the Owner an extra stock of paint consisting of five gallons of each color used in each coating material used, with such extra stock tightly sealed in clearly labeled containers.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Conform to State and local V.O.C. (Volatile Organic Compound) Regulations. Notify Architect in writing if variations to Specifications are required.

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- B. Do not apply materials when the surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- C. Do not apply exterior coating during rain, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
  - 1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

## PART 2 - PRODUCTS

### 2.1 PAINTING MATERIALS MANUFACTURER

- A. Painting materials shall be the products of the following manufacturers, specified as the type, function, and quality of products to be provided. Paint materials and specification numbers listed herein, unless otherwise designated, are the products of Sherwin-Williams and Tnemec Company, Inc and require no further approval as to manufacturer or catalog number.
- B. Products of the following manufacturers are acceptable as equal to Sherwin-Williams Paint Company, providing their products equal or exceed the quality specified, and the material types and composition are the same; and subject to approval by the Architect of the materials list required to be submitted under preceding Part 1 of this Section.
  - 1. Porter Paint, Louisville, Kentucky
  - 2. Glidden, Cleveland, Ohio
  - 3. ICI Devoe, Cleveland, Ohio
  - 4. MAB Paints, M.A. Bruder & Sons, Inc., Broomall, Pennsylvania
  - 5. Benjamin Moore & Company, Montvale, New Jersey
- C. Products of the following manufacturers are acceptable as equal to Tnemec, providing their products equal or exceed the quality specified.
  - 1. Induron Protective Coatings, Birmingham, Alabama.
  - 2. Ameron Protective Coatings Group, Brea, California.
  - 3. PPG
  - 4. Sherwiin-Williams

### 2.2 COMPATIBILITY

- A. Paint materials selected for coating systems for each type of surface shall be the product of a single manufacturer.
- B. Paint materials and equipment shall be compatible in use; finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; tools and equipment shall be compatible with the coating to be applied.
- C. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

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## 2.3 ACCEPTANCE OF SPECIFICATIONS

- A. By submitting a proposal, the Contractor has reviewed the bidding documents with the painting subcontractor and accepts the Specifications as sufficient to produce approved painting results. If the painting subcontractor contends that the materials or number of coats specified will not produce satisfactory results, he shall so notify the Architect directly or indirectly through a Bidding Contractor 10 days prior to receipt of bids for proper action.

## 2.4 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Prepare pigments:
  - 1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
  - 2. For good flow and brushing properties.
  - 3. Capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
- C. Mildew Resistance: Provide coatings which are formulated and mixed at the point of manufacture with mildewcides and fungicides to inhibit growth of mildew as encountered in the subtropical regions of the State of Florida. Mildewcides and fungicides containing compounds of mercury, lead or other heavy metals are not acceptable.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine areas and conditions under which painting work is to be applied and notify the Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Starting of painting work will be constructed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint surface.
- D. Test shop applied primers for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the maximums as recommended, for the types of coatings to be used, by the manufacturer.

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## 3.2 SURFACE PREPARATION

### A. General

1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions, and as herein specified, for each particular substrate condition.
2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted or provide surface applied protection prior to surface preparation and painting operations; remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminates from cleaning process will not fall onto wet, newly painted surfaces.

### B. Cementitious Materials

1. Prepare cementitious surfaces of concrete, concrete block, and cement plaster to be painted by removing efflorescence, chalk, dirt, grease, oils, and by roughening as required to remove glaze.
2. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
3. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid or other etching cleaner. Flush floor with clean water to neutralize acid and allow to dry before painting.

### C. Ferrous Metals

1. Clean ferrous surfaces, which are not galvanized or shop coated, of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning.
2. Touch-up shop applied prime coats wherever damaged or bare, where required by other Sections or these Specifications. Clean and touch-up with same type shop primer.

D. Galvanized Surfaces: Clean free of oil and surface contaminates with non-petroleum based solvent.

E. Aluminum Surfaces: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

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## 3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's direction.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

## 3.4 APPLICATION

- A. Paint during weather conditions and Project status that will ensure the best possible results.
- B. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
  - 1. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
  - 3. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
  - 4. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  - 5. Finish exterior doors on tops, bottoms, and side edges same as exterior faces unless otherwise indicated.
  - 6. Sand lightly between each succeeding enamel or varnish coat.
- C. Scheduling Painting: Apply first coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  - 1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
  - 2. Slightly vary the color of succeeding coats.
- D. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate and as specified, to establish a total dry film thickness as indicated or, if not indicated, as recommended by the coating manufacturer.

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- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed to view in interior occupied spaces and exterior walls and roof. Mechanical rooms and electrical rooms are not considered occupied spaces unless specifically noted as such.
- F. Prime Coats: Apply prime coat of material which is required to be painted or finished and which has not been prime coated by others.
  - 1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn through or other defects due to insufficient sealing.
  - 2. Coordinate manufacturer's prime coats with finish coats as specified herein. If compatibility is not ascertained during the bidding period, and verification submitted with the shop drawings, then prime coat paint system as specified herein shall be applied to the item prior to finish painting as specified herein.
- G. Pigmented (Opaque), Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surfaces imperfections.
- I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

## 3.5 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of Work remove from site discarded paint materials, rubbish, cans, and rags at end of each work day.
- B. Upon completion of painting work clean window glass and other paint- spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct damage by cleaning, repairing or replacing and repainting, as acceptable to Architect.
- D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- E. At the completion of Work of other trades, touch-up and restore damaged or defaced painted surfaces.

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## 3.6 PAINT TYPES AND NUMBER OF COATS

- A. The following painting schedules are intended to identify the type of finishes which are required for the various surfaces, and to identify the surfaces to which each finish is to be applied. Refer to Finish Schedule.
- B. To define requirements for quality, function, size, gages, textures, and color, the following list of materials designates the manufacturer's brand, types, and number of coats required; and other requirements that are to be furnished to conform to the requirements of this Project.
- C. Where specific finishes are called for on the Drawings and in the Finish Schedule by code designation, it shall specifically refer to the following identified types of coatings.
- D. The primer indicated under Material Identification is intended for the particular substrate surface specified. Where the same numbered finish is scheduled, but for another substrate, provide the proper primer compatible with substrate and the finish.
- E. Where the substrate has a compatible and satisfactory prime coat already on it, the prime coat specified for the numbered finish may be omitted. Test prime coat for compatibility before applying additional coats.

## 3.7 FIELD QUALITY CONTROL

- A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
  - 1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in the presence of the Contractor.
  - 2. Testing laboratory will perform appropriate tests for any or all of the following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.
- B. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

## 3.7 EXTERIOR PAINTING SCHEDULE

- A. Provide the following exterior paint systems based on Sherwin-Williams and Tnemec for substrates indicated.

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- B. **Ferrous Metal:** Provide the following finish systems over exterior ferrous metal.
1. **High-Build Acrylic Polyurethane Enamel:**
    - a. **Primer:** Metal primer applied at spreading rate recommended by the manufacturer.
      - 1) Tnemec: "Uni-Bond DF" Series 115
    - b. **Second Coat:** Epoxy intermediate coat applied at spreading rate recommended by the manufacturer.
      - 1) Tnemec: Series 66 Hi-Build Expoxoline
    - c. **Third Coat: Semigloss,** acrylic polyurethane enamel applied at spreading rate recommended by the manufacturer.
      - 1) Tnemec: Series 1075 Endura-Shield
    - d. **Surfaces:** All exterior steel scheduled to be painted, hollow metal doors and frames.
    - e. This paint system shall be spray applied only, brush application is not allowed.
- C. **Elastomeric Finish System:** Provide the following elastomeric finish system over exterior CMU
1. **Elastomeric Finish System – Modified Waterborne Acrylate**
    - a. **Primer:** Self-priming.
    - b. **First and Second Coats: Flat,** exterior elastomeric paint applied at spreading rate recommended by the manufacturer.
      - 1) Tnemec: Enviro-Crete Series 156
    - c. Surfaces: Exterior CMU and stucco.
    - d. Provide manufacturers ten (10) year warranty for this elastomeric paint system.
- D. **Textured Finish:** Provide the following textured finish on exterior concrete columns:
1. Textured Coatings of America, Inc., Fort Lauderdale, Florida: TEX – COTE – STONE TEX Textured Coating. Provide a smooth finish.
    - a. Surfaces: Exterior concrete columns
    - b. Smooth finish.

## 3.8 INTERIOR PAINTING SCHEDULE

- A. Provide the following **interior** paint systems based on **Sherwin-Williams and Tnemec** for substrates indicated:

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B. **Concrete Masonry Units:** Provide the following finish systems over interior concrete masonry block units:

1. **Acrylic-Latex Finish:**

a. **Block Filler:** High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer.

1) Sherwin-Williams: PrepRite Block Fillere B25W25

b. **First and Second Coats: Semi-Gloss,** acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.

1) Sherwin-Williams: ProMar 200 Latex Semi-Gloss B31W200

c. Surfaces: New masonry walls, where epoxy is not indicated.

2. **Epoxy:**

a. **Block Filler:** Waterborne epoxy polyamide.

1) Sherwin-Williams: Epo-Flex WB Epoxy Block Filler

b. **First and Second Coats: Satin,** Waterborne epoxy polyamide.

1) Sherwin-Williams: Water Base Epoxy B 70/ B60V25 S/G Hardener

c. Surfaces: New masonry walls where epoxy is indicated.

C. **Ferrous Metal:** Provide the following finish systems over interior ferrous metal:

1. **High-Build Acrylic Polyurethane Enamel:**

a. **Primer:** Metal primer applied at spreading rate recommended by the manufacturer.

1) Tnemec: "Tneme-Fascure" Series 161

b. **Second Coat: Semi-Gloss,** acrylic polyurethane enamel applied at spreading rate recommended by the manufacturer.

1) Tnemec: Series 1075 Endura-Shield

c. Surfaces: Hollow metal doors, frames, and railings, exposed steel joists, steel deck, steel trusses, miscellaneous steel, etc. where scheduled, noted to be painted, or exposed to view.

Note: When the manufacturing of paint supplied does not require or recommend a primer, and a single coat will provide required coverage, approval from the Architect must be obtained to delete second coat; and a credit shall be due the Owner.

END OF SECTION 09 91 00

**Division 10**  
Specialties



# Downtown Bradenton Transit Station

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SECTION 10 14 00  
IDENTIFYING DEVICES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for the complete installation of identifying devices as indicated on the Drawings and specified herein.
  - 1. County seal bronze plaque.
  - 2. Exterior letters.
  - 3. Signage.

### 1.2 SUBMITTALS

- A. Furnish required shop drawings and other submittals as required for Architect selection in accordance with Division 01 requirements.
- B. Product data sheets including installation instructions for each item specified.
- C. Samples:
  - 1. Exterior building letters.
  - 2. County seal bronze plaque rubbing.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Dedication Plaque, interior identifying devices, and exterior building letters shall be as manufactured by one of the following:
  - 1. Basis of Design: Gulf Coast Signs, Sarasota, Florida
  - 2. Commercial Signs & Graphics, West Palm Beach, Florida.
  - 3. Environmental Graphics, Inc., Tampa, Florida.
  - 4. Signs Plus, Sarasota, Florida

### 2.2 EXTERIOR BUILDING LETTERS

- A. All as indicated on the Drawings.
- B. Provide a clear back on exterior letters as noted.
- C. Verify actual copy and layout with Owner and Architect prior to fabrication.
- D. Provide all items and accessories as required for a complete installation in every respect.

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## 2.3 COUNTY SEAL BRONZE PLAQUE

- A. Size as indicated on the drawings, cast bronze, with raised letters mechanically attached to walls.
- B. Provide all items and accessories as required for a complete installation in every respect.

## 2.5 OTHER SIGNAGE

- A. All other signage shall be as indicated on the drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Provide full size mounting and installation kits for mounting building letters.
- C. Mount exterior and interior building letters in conformance with manufacturer's instructions using only approved materials and methods.
- D. Provide all accessories and items as required, whether or not specified or indicated, for a complete installation in every respect.
- E. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- F. Provide attachment and connection devices necessary for securing Work. Secure Work true to line and level. Allow for building expansion.
- G. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- H. Recheck measurements and dimensions, before starting each installation.
- I. Isolate incompatible material as necessary to prevent deterioration.

END OF SECTION 10 14 00

# Downtown Bradenton Transit Station

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SECTION 10 21 16  
SOLID PLASTIC TOILET COMPARTMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. The Work of this Section includes toilet compartments and accessories indicated on Drawings, schedules, and in these Specifications. Refer to Drawings for location, size, and quantity required.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product Data: Submit manufacturer's standard technical data for all required types of products. Include manufacturer's recommendations for cleaning and maintenance methods for indicated types of units.
- C. Complete shop Drawings by approved manufacturer for proposed toilet compartments, including appurtenances and all accessories.
- D. Complete suitable color selection materials for components (actual samples) in triplicate quantity, for all available color groups.
- E. Submit warranty as specified herein.

### 1.3 ACCESSIBILITY REQUIREMENTS

- A. Toilet compartments shall be provided to conform with the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this Section.

### 1.4 WARRANTY

- A. Manufacturer's Warranty: Toilet compartment manufacturer shall warrant plastic panels to remain free from warping, breaking, and from material and manufacturing defects for indicated period of time. Products which become defective during warranty period shall be repaired to eliminate all evidence of damage. If such repairs to completely eliminate all evidence of damage cannot be made, defective units shall be removed and replaced with new units that comply with indicated requirements.

1. Warranty Period: Fifteen (15) years from the Date of Substantial Completion.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Toilet compartments shall be the products of "Poly-Mar HD", solid one inch thick plastic as manufactured by Santana Products Company, Scranton, Pennsylvania; specified as the type, size, function, and quality of equipment; [www.hinyhider.com](http://www.hinyhider.com).
- B. Products of the following manufacturers are acceptable, providing their solid plastic toilet compartments equals or exceeds the quality specified; and they can provide equipment of the type, size, function, and arrangement required.
1. Accurate Partitions, Lyons, Illinois; [www.accuratepartitions.com](http://www.accuratepartitions.com)
  2. Comtec Industries, Inc., div. of Compression Polymers Group Corp., Moosic, Pennsylvania; [www.comtecindustries.com](http://www.comtecindustries.com)
  3. General Partitions Manufacturing Corp., Erie, Pennsylvania; [www.genpartitions.com](http://www.genpartitions.com)
  4. Rockville Partitions, Inc, Rockville, Maryland; [www.rockvillepartitions.com](http://www.rockvillepartitions.com)
  5. Columbia Partitions by Partition Systems Incorporated of South Carolina, Columbia SC; [www.psisc.com](http://www.psisc.com)
- C. Type: Floor supported with overhead top rail bracing, solid plastic compartments.



### 2.2 MATERIALS

- A. Materials, panels, doors, pilasters, and screens shall be fabricated from polymer resins High Density Polyethylene (HDPE) containing a minimum of 10% recycled material manufactured under high pressure forming a single component section which is waterproof, corrosion-proof, impact resistant nonabsorbent, and has a self lubricating surface that resists marking with pens, pencils, lipstick, and other writing or marking utensils.
1. Color: as selected by the Architect.
- B. Solid plastic materials (HDPE) shall conform to ASTM E84 for fire resistance. Manufacturer shall submit necessary ASTM test data to comply with fire codes.

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## 2.3 CONSTRUCTION

- A. Partitions shall have edges machined to a radius of 0.250 inch and sharp corners removed. Dividing toilet partition panels and doors shall be 55 inches high and mounted 14 inches above finished floor.
- B. Pilasters for the toilet partitions shall be 82 inches high and fastened to 3 inches high solid plastic shoes with theftproof stainless steel sex bolts.
- C. Unless dimensioned otherwise on Drawings, toilet partitions are to be 60 inches deep and 36 inches wide.
  - 1. Outswinging doors (for handicapped) shall be 34 inches wide.
  - 2. Inswinging doors (for handicapped) are to be 34 inches wide (if compartment has side entry, minimum is 36 inches), and other (inswinging) doors to be either 24 inches or 26 inches wide for each run
- D. Provide internal reinforcement for all accessories.
- E. Properties:
  - 1. Dual component compression molded High Density Polyethylene (HDPE) of solid Poly-Mar HD, Poly-Marble HD, or Poly-Granite HD virgin resin materials in colors that extend throughout the surface; the panels, doors, and pilasters shall have combined recycled and/or virgin material (HDPE) as the core material.
  - 2. Doors, panels and pilasters shall be a minimum of 1 inch thick and all edges machined to a radius of 0.250 inch and all exposed surfaces to be free of saw marks.

## 2.4 TOILET PARTITION HARDWARE

- A. Door hardware shall be as follows:
  - 1. Hinges shall be stainless steel continuous hinges. Door closures to be factory set to accommodate all conditions and allow for a positive opening and closing action free of impediment.
  - 2. Each handicapped door to include: (1) door pull (1) wall stop.
  - 3. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6364-T5 Alloy) with clear anodized finish with wrap around flange surface mounted and thru-bolted to pilaster with one-way sex bolts. Size of strike shall be 6 inches in length.
  - 4. Door latch housing shall be fabricated from heavy aluminum extrusion (6364-T5 Alloy) with clear anodized finish, surface mounted and thru-bolted to door with one-way sex bolts. Slide bolt and button shall be heavy aluminum with black anodized finish.
- B. Satin finish stainless steel pilaster shoes shall be anchored to finished floor with anchors and #14 x 1 ½ inch stainless steel Phillips head screws.

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- C. Full length continuous wall brackets shall be satin finish stainless steel. Brackets shall be used for all panels to pilaster, pilasters to wall and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts. Attachment of brackets to adjacent wall construction shall be accomplished by #14 x 1 ½ inch stainless steel Phillips head screws anchored directly behind the vertical edge of panels and pilasters at 13 inch intervals along the full length of bracket and at each 13 inch interval alternately spaced between anchor connections.
- D. Headrail shall be heavy aluminum extrusion (6364-T5 Alloy) with bright-dipped anodized finish in anti-grip configuration weighting not less than 1.188 lbs. per linear foot. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel sex bolts (no cadmium plated sex bolts allowed).
- E. Bottom of partition panels and doors are to be fitted with bright dipped, anodized aluminum, heavy duty continuous channel. Channel shall match thickness of door or panel and turn up each side a minimum of ¼ inch. Attach per manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install units as shown in true and plumb condition.
- B. Anchor brackets securely with fasteners indicated on approved Shop Drawings.
- C. Install in accordance with manufacturer's written installation instructions and approved Shop Drawings.
- D. All parts shall be erected in a substantial manner, straight, level, and plumb.
- E. No evidence of drilling, cutting, or patching shall be visible in the finished work.
- F. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed ¼ inch.
- G. Finished surfaces shall be cleaned after installation and left free of imperfections.
- H. Authorized factory installers to be utilized.
- I. Provide all items and accessories as required for a complete and total installation in every respect.

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## 3.2 ADJUSTMENT

- A. Doors are to be adjusted so that they are approximately 3 inches open when cubicle is unoccupied.
- B. Door at handicapped cubicles shall be easily removable from exterior side when locked.

## 3.3 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

END OF SECTION 10 21 16



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SECTION 10 28 13  
TOILET ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes toilet accessory items as scheduled and specified. Refer to the Toilet Accessory Schedule on the Drawings for product numbers.

### 1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.
- C. Samples of each toilet accessory item to verify design, operation, and finish requirements. Acceptable full-size samples will be returned and may be used in the Work.
- D. Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for project.
- E. Setting Drawings where cutouts are required in other Work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.
- F. Maintenance instructions including replaceable parts and service recommendations.
- G. Submit warranty as specified herein.

### 1.3 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish accessory Manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other Work to avoid delay.
- B. Single-Source Responsibility: Provide products of same Manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect.

### 1.4 PROJECT CONDITIONS

- A. Coordination: Coordinate accessory locations, installation, and sequencing with other Work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

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## 1.5 WARRANTY

- A. Toilet Accessory Warranty: Provide manufacturers one (1) year warranty from the Date of Substantial Completion, against defects in material and workmanship.
- B. Mirror Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within 15 years from the Date of Substantial Completion.

## 1.6 FLORIDA ACCESSIBILITY CODE FOR BUILDING CONSTRUCTION

- A. Toilet accessories shall conform with the Accessibility Requirements Manual from the Florida Department of Community Affairs, Florida Board of Building Codes and Standards.

## PART 2 - PRODUCTS

### 2.1 TOILET ACCESSORY MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide toilet accessories by one of the following:
  - 1. Basis of Design: Bobrick Washroom Equipment, Inc., Clifton Park, NY
  - 2. Bradley Corporation, Menomonee Falls, WI
  - 3. American Specialties, Inc., Yonkers, New York
  - 4. A&J Washroom Accessories, New Windsor, New York
  - 5. McKinney/Parker, San Francisco, CA
- B. Products on the Toilet Accessory Schedule are based on Bobrick.

### 2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gage) minimum thickness.
- B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20-gage) minimum. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527, G60.
- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- F. Mirror Glass: Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, latest edition, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.

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- G. Galvanized Steel Mounting Devices: ASTM A 153, latest edition, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

## 2.3 FABRICATION

- A. No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating Manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
  - 1. Provide galvanized-steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:
  - 1. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
  - 2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six keys to Owner's representative.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to Manufacturer's instructions for type of substrate involved.
- C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F 446.
- D. Provide all items and accessories as required for a complete and total installation in every respect, whether or not specified or indicate don the Drawings.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

### 3.3 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.

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- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

END OF SECTION 10 28 13

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SECTION 10 73 26  
ALUMINUM WALKWAY CANOPY

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide all labor, materials, and equipment necessary for complete installation of pre-engineered aluminum walkway canopy and related items indicated on Drawings and specified herein.

### 1.2 SUBMITTALS

- A. Shop Drawings; submit in accordance with Division 1 requirements.
  - 1. Submit customary and complete shop drawings for proposed miscellaneous metal items requiring shop fabrications.
  - 2. Shop Drawings shall consist of plans and elevations at not less than 1 inch to 1 foot scale and include details of sections and connections at not less than 3 inches to 1 foot scale.
  - 3. Show anchorage and accessory items. Show all expansion joint locations and details. Provide templates for anchor and bolt installation by others.
  - 4. Detail all anticipated field welds and mechanical joints and show locations on plans.
  - 5. Submit structural calculations, signed and sealed by a Professional Engineer in the State of Florida verifying compliance with ASCE/SEI 7, latest edition.
  - 6. Provide a certification letter showing compliance with ASCE/SEI 7, latest edition and FBC 423.9. Letter to be signed and sealed by a Florida Registered Engineer.
- B. Submit color samples of material finishes for Architect's selection.
- C. Product Data:
  - 1. Submit manufacturer's standard published product data for purchased metal items being incorporated into the Work at the project site.
- D. Installer's Certification from manufacturer.

### 1.3 QUALITY ASSURANCE

- A. Canopy system shall be designed to meet wind-loading requirements for the State of Florida. Refer to Structural Drawings for wind velocity.
  - 1. Local and State wind code requirements as well as structural design for wind forces must comply with the requirements of ASCE 7-93. Design wind velocity shall be 150 mph times 1. Importance Factor equals 150 mph. Comply with SREF 5.3 (15) (d) 1.
  - 2. Manufacturer to supply certification to above requirements.
- B. Installers shall be certified by the manufacturer.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: The plans and specifications are based on the standard details of Dittmer Architectural Products, Orlando, Florida. Alternate acceptable manufacturers, subject to conformance with plans and material specified are:
1. E.L. Burns Co., Inc. Shreveport, Louisiana
  2. Perfection Architectural Systems, Orlando, Florida
  3. Peachtree Protective Covers, Inc., Hiram, Georgia.
  4. American Walkway Covers, LLC, Pompano Beach, Florida
  5. Mason-Dixon, LLC

### 2.2 MATERIALS

- A. Extruded aluminum 6063-T6.
- B. Standard type 6 by 6 inch corrugated self-flashing deck with gutter beams, integral downspouts, exposed canopy downspouts, attachments, and hurricane flange.
- C. Beams and columns to be a welded rigid aluminum bents with downspouts, flange, anchors, sleeves, etc., as required for a complete and working installation.
- D. Complete system to be designed and bear the seal of a State of Florida Registered Engineer.

### 2.3 CONSTRUCTION

- A. Canopies shall be the size, length, and configuration indicated on the Drawings. Included under the Work of this Section is the structural tubular aluminum beams, columns, canopy downspouts, and their placement within the concrete and masonry columns supporting the canopies.
- B. Any required welding shall be by the heliarc process with all exposed or condensation to the exterior.
- C. Concealed Drainage: Water shall drain internally from the deck into the beams into pre-determined columns for discharge at ground level or connected to underground storm water drainage system.
1. Drainage openings to be factory cut with internal diverters to direct the flow of water.
- D. Bent Construction: Anodized beams and columns shall be welded into one piece rigid bents in the factory and built with a mechanical slip joint for fabrication at the job site. Extruded structural ties shall be rigidly installed on top of all beam sections and shall also serve as closures between draining deck sections.

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1. Mechanical slip joints may be used for shipping purposes. Field weld seams after erection.
  2. The opening from the decking into the bent shall be at a minimum, the width minus the bent metal thickness and open the full width of the lower level flute.
- E. Roof Deck: Extruded roof deck sections shall be composed of interlocking and self-flashing sections. Self-flashing and interlocking joints shall be fastened rigidly with fastenings as shown on shop drawings.
1. Expansion Joints: Structure shall be designed for temperature changes of 120 degrees F with expansion joints provided if required and shown on shop drawings. Expansion joints shall have no metal-to-metal contact.
  2. Finish: Sections shall be free of scratches and other serious surface blemishes and chemically cleaned. Aluminum sections shall be given a caustic etch followed by an Architectural Class I (0.7 mil and greater) anodic clear (natural) coating conforming to AA-M12C22A41.
- F. Erection: Erection shall be in accordance with manufacturer approved shop drawings. Erection shall be performed by manufacturer's approved and authorized agents or dealer and shall be scheduled after all concrete, masonry and roofing work in the vicinity is complete and cleaned. All bents shall be straight and true in accordance with the approved shop drawings prior to placing concrete. Aluminum columns embedded in concrete shall be protected with 2 coats clear acrylic. Care shall be taken to prevent damage or scratching; all components of canopy to be cleaned on completion and work area left in a neat condition.
- G. Complete system shall be rigid frame with a water-tight internal drainage system.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Canopy manufacturer shall examine surfaces prior to the start of installation. Deviations from the approved shop drawings shall be brought to the attention of the Contractor at once.

### 3.2 PREPARATION

- A. Aluminum surfaces that are to come in contact with dissimilar materials shall be protected with one coat of asphaltic emulsion paint in addition to factory protection.

### 3.3 INSTALLATION

- A. Erection of the canopies shall be completed by an installer approved by the manufacturer in accordance with approved shop drawings.
- B. Only specialized mechanics having at least 2 years experience in this type of work shall be employed in the erection of the canopies.

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- C. Install all items in strict accordance with the manufacturers written installation instructions.
- D. Provide all items and accessories as required for a complete installation in every respect.

## 3.4 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Canopy column drains will not be permitted to drain across concrete walkways.

END OF SECTION 10 73 26

**Division 22**  
Plumbing



PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. Equipment installation requirements common to equipment sections.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

- A. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

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2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

### PART 2 - PRODUCTS

#### 2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

#### 2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Solvent Cements for Joining Plastic Piping:
  1. ABS Piping: ASTM D 2235.
  2. CPVC Piping: ASTM F 493.
  3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  4. PVC to ABS Piping Transition: ASTM D 3138.

#### 2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- D. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

#### 2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

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- C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- D. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- E. PVC Pipe: ASTM D 1785, Schedule 40.
- F. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

### 2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated and rough brass.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated and rough brass.

### 2.6 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

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- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Verify final equipment locations for roughing-in.
- P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

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- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- F. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- G. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

### 3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 2. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.5 GROUTING

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.

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- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 22 05 00

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SECTION 22 05 18  
ESCUTCHEONS FOR PLUMBING PIPING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Escutcheons.
  - 2. Floor plates.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

## PART 2 - PRODUCTS

### 2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

### 2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
  - 1. Escutcheons for New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.

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- c. Insulated Piping: One-piece, stamped-steel type.
  - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
  - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
  - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
  - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
  - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
  - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
  - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
  - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- 1. New Piping: One-piece, floor-plate type.
- 3.2 FIELD QUALITY CONTROL
- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. Bronze swing check valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.2 SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.3 QUALITY ASSURANCE

- A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
1. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

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1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

### F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

## 2.2 BRASS BALL VALVES

### A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Hammond Valve.
  - d. Milwaukee Valve Company.
  - e. NIBCO INC.
2. Description:
  - a. Standard: MSS SP-110.
  - b. SWP Rating: 150 psig.
  - c. CWP Rating: 600 psig.
  - d. Body Design: Two piece.
  - e. Body Material: Forged brass.
  - f. Ends: Threaded.
  - g. Seats: PTFE or TFE.
  - h. Stem: Brass.
  - i. Ball: Chrome-plated brass.
  - j. Port: Full.

## 2.3 BRONZE BALL VALVES

### A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Conbraco Industries, Inc.; Apollo Valves.
  - b. Crane Co.; Crane Valve Group; Crane Valves.
  - c. Hammond Valve.
  - d. Milwaukee Valve Company.
  - e. NIBCO INC.
  - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
  - a. Standard: MSS SP-110.

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- b. SWP Rating: 150 psig.
- c. CWP Rating: 600 psig.
- d. Body Design: Two piece.
- e. Body Material: Bronze.
- f. Ends: Threaded.
- g. Seats: PTFE or TFE.
- h. Stem: Bronze.
- i. Ball: Chrome-plated brass.
- j. Port: Full.

2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Crane Co.; Crane Valve Group; Stockham Division.
  - d. Hammond Valve.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Description:
  - a. Standard: MSS SP-80, Type 3.
  - b. CWP Rating: 200 psig.
  - c. Body Design: Horizontal flow.
  - d. Body Material: ASTM B 62, bronze.
  - e. Ends: Threaded.
  - f. Disc: Bronze.

B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Crane Co.; Crane Valve Group; Stockham Division.
  - d. Hammond Valve.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Description:
  - a. Standard: MSS SP-80, Type 4.
  - b. CWP Rating: 200 psig.
  - c. Body Design: Horizontal flow.
  - d. Body Material: ASTM B 62, bronze.
  - e. Ends: Threaded.

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- f. Disc: PTFE or TFE.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

3.2 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
  - 1. Shutoff Service: Ball valves.
  - 2. Throttling Service: Ball valves.
  - 3. Pump-Discharge Check Valves:
    - a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
  - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
  - 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
  - 4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
  - 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
  - 6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.4 DOMESTIC COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.

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2. Bronze Angle Valves: Class 125, nonmetallic disc.
3. Ball Valves: Two piece, full port, brass or bronze with bronze trim.
4. Bronze Swing Check Valves: Class 125, nonmetallic disc.
5. Bronze Globe Valves: Class 125, nonmetallic] disc.

END OF SECTION 22 05 23



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## SECTION 22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Fastener systems.
  - 4. Equipment supports.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
  - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
  - 1. Trapeze pipe hangers.
  - 2. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

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## 1.5 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

## PART 2 - PRODUCTS

### 2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
  - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

### 2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

### 2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 2.4 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

### 2.5 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

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- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
  - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

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- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- K. Insulated Piping:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

## 3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

## 3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

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## 3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

## 3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

## 3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
  - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
  - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
  - 4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  - 5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
  - 6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
  - 7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

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- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- L. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
  2. Warning signs and labels.
  3. Pipe labels.

1.2 SUBMITTAL

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
  2. Letter Color: White.
  3. Background Color: Black.
  4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  7. Fasteners: Stainless-steel self-tapping screws.
  8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

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### 2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Red.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

### 2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

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3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Paint piping as specified.
- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
  - 1. Domestic Water Piping:
    - a. Background Color: White.
    - b. Letter Color: Blue.
  - 2. Sanitary Waste and Storm Drainage Piping:
    - a. Background Color: White.
    - b. Letter Color: Green.

END OF SECTION 22 05 53



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SECTION 22 07 19  
PLUMBING PIPING INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes insulating the following plumbing piping services:
  - 1. Domestic hot-water piping.
  - 2. Domestic hot-water recirculation piping.
  - 3. Supplies and drains for handicap-accessible lavatories and sinks.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
- C. Field quality-control reports.

### 1.3 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
- B. Comply with the following applicable standards and other requirements specified for miscellaneous components:
  - 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

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- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Mineral-Fiber, Preformed Pipe Insulation:
  - 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. Fibrex Insulations Inc.; Coreplus 1200.
    - b. Johns Manville; Micro-Lok.
    - c. Knauf Insulation; 1000-Degree Pipe Insulation.
    - d. Manson Insulation Inc.; Alley-K.
    - e. Owens Corning; Fiberglas Pipe Insulation.
  - 2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

## 2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 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. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
    - b. Eagle Bridges - Marathon Industries; 225.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
    - d. Mon-Eco Industries, Inc.; 22-25.
  - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 3. Use adhesive that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

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- a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
  - b. Eagle Bridges - Marathon Industries; 225.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
  - d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  3. Use adhesive that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

## 2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
  1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.4 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
  2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
  3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

## 2.5 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  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. ABI, Ideal Tape Division; 428 AWF ASJ.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    - c. Compac Corporation; 104 and 105.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
  2. Width: 3 inches.
  3. Thickness: 11.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.

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7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

## 2.6 PROTECTIVE SHIELDING GUARDS

### A. Protective Shielding Pipe Covers,:

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. Engineered Brass Company.
  - b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
  - c. McGuire Manufacturing.
  - d. Plumberex.
  - e. Truebro; a brand of IPS Corporation.
  - f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.

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- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above-ambient services, do not install insulation to the following:
  - 1. Vibration-control devices.
  - 2. Testing agency labels and stamps.
  - 3. Nameplates and data plates.
  - 4. Cleanouts.

## 3.3 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

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1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

### 3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

### 3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

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2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

## 3.6 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
  2. Underground piping.
  3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

## 3.7 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Hot and Recirculated Hot Water: Insulation shall be the following:
1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Storm Water and Overflow: Insulation shall be the following:
1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- C. Roof Drain and Overflow Bodies: Insulation shall be the following:
1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- D. Exposed Sanitary Drains, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be the following:
1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick, with Protective Shielding Guards.

END OF SECTION 22 07 19



PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
  - 2. Escutcheons.
  - 3. Sleeves and sleeve seals.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.3 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 CPVC PIPING

- A. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.3 PVC PIPE AND FITTINGS

- A. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.
  - 1. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

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2.4 PIPING JOINING MATERIALS

- A. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
  - 1. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.5 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.6 TRANSITION FITTINGS

- A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- B. Sleeve-Type Transition Coupling: AWWA C219.
- C. Plastic-to-Metal Transition Fittings:
  - 1. Description: CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.
- D. Plastic-to-Metal Transition Unions:
  - 1. Description: CPVC or PVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

2.7 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Stamped Steel: Chrome-plated finish with setscrew or spring clips.

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- C. Split Plate, Stamped Steel: Chrome-plated finish with concealed hinge, setscrew or spring clips.
- D. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

### 2.8 SLEEVES

- A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.

### 2.9 SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
  - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 2. Pressure Plates: Stainless steel.
  - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

### 2.10 GROUT

- A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

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- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements for pressure gages, drain valves and strainers.
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- E. Install domestic water piping level without pitch and plumb.
- F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- J. Install piping adjacent to equipment and specialties to allow service and maintenance.
- K. Install piping to permit valve servicing.
- L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- M. Install piping free of sags and bends.
- N. Install fittings for changes in direction and branch connections.

### 3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

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- E. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
  - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 3. PVC Piping: Join according to ASTM D 2855.

### 3.3 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

### 3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
  - 1. NPS 1-1/2 and Smaller: Fitting-type coupling.
  - 2. NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

### 3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- D. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
  - 2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.

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- E. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.
- F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### 3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

### 3.7 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
  - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
  - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel with set screw or spring clips.
  - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece or split plate, stamped steel with set screw.
  - 4. Bare Piping in Unfinished Service Spaces: One piece, stamped steel with set screw or spring clips.
  - 5. Bare Piping in Equipment Rooms: One piece, stamped steel with set screw or spring clips.
  - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

### 3.8 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.

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- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- G. Seal space outside of sleeves in concrete slabs and walls with grout.
- H. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- I. Install sleeve materials according to the following applications:
  - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
  - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
    - a. Extend sleeves 2 inches above finished floor level.
    - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Flashing and Sheet Metal" for flashing.
  - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
    - a. PVC pipe sleeves for pipes smaller than NPS 6.
    - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
    - c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
  - 4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
  - 5. Sleeves for Piping Passing through Exterior Concrete Walls:
    - a. Steel pipe sleeves for pipes smaller than NPS 6.
    - b. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.

### 3.9 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.10 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

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3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
  - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
  - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
  - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
  - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
  - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
  - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
  - 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  - 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
  - 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  - 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.12 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
  - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

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- a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Fill and isolate system according to either of the following:
    - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
    - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
  - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
  - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.13 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:
  - 1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- D. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be one of the following:
  - 1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
  - 1. CPVC Tubing System: CPVC tube; CPVC socket fittings; and solvent-cemented joints.

3.14 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 11 16



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SECTION 22 11 19  
DOMESTIC WATER PIPING SPECIALTIES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following domestic water piping specialties:
  - 1. Water hammer arresters.
  - 2. Trap-seal primer valves.
- B. See Division 22 Section "Water Fountains" for water filters for water coolers.

### 1.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

### 1.4 QUALITY ASSURANCE

- A. NSF Compliance:
  - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
  - 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

## PART 2 - PRODUCTS

### 2.1 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AMTROL, Inc.

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- b. Josam Company.
  - c. MIFAB, Inc.
  - d. PPP Inc.
  - e. Sioux Chief Manufacturing Company, Inc.
  - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - g. Tyler Pipe; Wade Div.
  - h. Watts Drainage Products Inc.
  - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASSE 1010 or PDI-WH 201.
  3. Type: Copper tube with piston.
  4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

## 2.2 TRAP-SEAL PRIMER VALVES

### A. Supply-Type, Trap-Seal Primer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - b. Watts Industries, Inc.; Water Products Div.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install water hammer arresters in water piping according to PDI-WH 201.
- C. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- D. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- E. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

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## 3.2 FIELD QUALITY CONTROL

- A. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

END OF SECTION 22 11 19



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SECTION 22 13 16  
SANITARY WASTE AND VENT PIPING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
  - 1. Pipe, tube, and fittings.
  - 2. Special pipe fittings.

### 1.2 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

### 1.3 SUBMITTALS

- A. Field quality-control inspection and test reports.

### 1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
  - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
  - 2. Solvent Cement and Adhesive Primer:
    - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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## PART 3 - EXECUTION

### 3.1 PIPING APPLICATIONS

- A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- C. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
  - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
  - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

### 3.2 PIPING INSTALLATION

- A. Sanitary sewer piping outside the building as specified.
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."
- E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
  - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
  - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

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3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- H. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- I. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- J. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

## 3.3 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

## 3.4 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
  1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  2. Individual, Straight, Horizontal Piping Runs: According to the following:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
  1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
  2. NPS 3: 48 inches with 1/2-inch rod.
  3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- F. Install supports for vertical PVC piping every 48 inches.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

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## 3.5 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
  - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
  - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code
  - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

## 3.6 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
  - 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 2. Prepare reports for tests and required corrective action.

## 3.7 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

## 3.8 PROTECTION

- A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

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END OF SECTION 22 13 16



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SECTION 22 13 19  
SANITARY WASTE PIPING SPECIALTIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Miscellaneous sanitary drainage piping specialties.

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

### 1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

## PART 2 - PRODUCTS

### 2.1 CLEANOUTS

A. Exposed Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Josam Company; Josam Div.
  - b. MIFAB, Inc.
  - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - d. Tyler Pipe; Wade Div.
  - e. Watts Drainage Products Inc.
  - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Floor Cleanouts:

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Josam Company; Josam Div.
  - b. Oatey.
  - c. Sioux Chief Manufacturing Company, Inc.
  - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - e. Tyler Pipe; Wade Div.
  - f. Watts Drainage Products Inc.
  - g. Zurn Plumbing Products Group; Light Commercial Operation.
  - h. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: As Required.
7. Outlet Connection: Inside caulk.
8. Closure: Brass plug with straight threads and gasket.
9. Adjustable Housing Material: Cast iron with threads.
10. Frame and Cover Material and Finish: Polished bronze.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Heavy Duty.
13. Riser: ASTM A 74, Extra-Heavy Service class, cast-iron drainage pipe fitting and riser to cleanout.

## C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Josam Company; Josam Div.
  - b. MIFAB, Inc.
  - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - d. Tyler Pipe; Wade Div.
  - e. Watts Drainage Products Inc.
  - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: as required to match connected piping.
5. Closure: Countersunk or raised-head, plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

## 2.2 FLOOR DRAINS

### A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Commercial Enameling Co.

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- b. Josam Company; Josam Div.
  - c. MIFAB, Inc.
  - d. Prier Products, Inc.
  - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - f. Tyler Pipe; Wade Div.
  - g. Watts Drainage Products Inc.
  - h. Zurn Plumbing Products Group; Light Commercial Operation.
  - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.3.
  3. Pattern: Floor drain.
  4. Body Material: Gray iron.
  5. Seepage Flange: As required, see drawings.
  6. Anchor Flange: As required, see drawings.
  7. Clamping Device: As required, see drawings..
  8. Outlet: Side.
  9. Backwater Valve: Not required.
  10. Coating on Interior and Exposed Exterior Surfaces: Not required.
  11. Sediment Bucket: As required, see drawings.
  12. Top or Strainer Material: Nickel bronze.
  13. Top of Body and Strainer Finish: Nickel bronze.
  14. Top Shape: Round.
  15. Top Loading Classification: Heavy Duty.
  16. Funnel: Not required.
  17. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
  18. Trap Material: Cast iron.
  19. Trap Pattern: Deep-seal P-trap.
  20. Trap Features: Cleanout and trap-seal primer valve drain connection.

## 2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

### A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

### B. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
  - a. NPS 2: 4-inch- minimum water seal.
  - b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

### C. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.

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2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
  1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  2. Locate at each change in direction of piping greater than 45 degrees.
  3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
  4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  1. Position floor drains for easy access and maintenance.
  2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
    - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
  3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Assemble open drain fittings and install with top of hub 1 inch above floor.
- G. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- H. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
  1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
  2. Size: Same as floor drain inlet.

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- I. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- J. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

## 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

## 3.3 LABELING AND IDENTIFYING

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

## 3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19



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SECTION 22 14 13  
FACILITY STORM DRAINAGE PIPING

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

#### B. Related Section:

1. Section 334100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

### 1.2 ACTION SUBMITTALS

- #### A. Product Data: For each type of product indicated.

### 1.3 INFORMATIONAL SUBMITTALS

- #### A. Field quality-control reports.

### 1.4 QUALITY ASSURANCE

- #### A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- #### B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- #### A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

### 2.2 PVC PIPE AND FITTINGS

- #### A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

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- B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Adhesive Primer: ASTM F 656.
  - 1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Solvent Cement: ASTM D 2564.
  - 1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.3 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
  - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
  - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
  - 3. Unshielded, Nonpressure Transition Couplings:
    - 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) [Dallas Specialty & Mfg. Co.](#)
      - 2) [Fernco Inc.](#)
      - 3) [Mission Rubber Company; a division of MCP Industries, Inc.](#)
      - 4) [Plastic Oddities; a division of Diverse Corporate Technologies, Inc.](#)
    - b. Standard: ASTM C 1173.
    - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    - d. Sleeve Materials:
      - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
  - 4. Shielded, Nonpressure Transition Couplings:

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- 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) Cascade Waterworks Mfg. Co.
  - 2) Mission Rubber Company; a division of MCP Industries, Inc.
- b. Standard: ASTM C 1460.
- c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

## PART 3 - EXECUTION

### 3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

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- J. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
  - 1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
  - 2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.
- K. Install aboveground PVC piping according to ASTM D 2665.
- L. Install underground PVC piping according to ASTM D 2321.
- M. Plumbing Specialties:
  - 1. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
  - 2. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

## 3.3 JOINT CONSTRUCTION

- A. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

## 3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
  - 1. Install transition couplings at joints of piping with small differences in OD's.
  - 2. In Drainage Piping: Shielded, nonpressure transition couplings.

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## 3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
  - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
  - 2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
  - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 4. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
- B. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
  - 2. NPS 3: 48 inches with 1/2-inch rod.
  - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
  - 4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
  - 5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.
- F. Install supports for vertical PVC piping every 48 inches.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

## 3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect storm drainage piping to roof drains and storm drainage specialties.
  - 1. Comply with requirements for cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

## 3.7 IDENTIFICATION

- A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

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## 3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  - 3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
  - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 5. Prepare reports for tests and required corrective action.

## 3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

## 3.10 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground storm drainage piping NPS 6 and smaller shall be the following:
  - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  - 2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- C. Underground storm drainage piping NPS 6 and smaller shall be the following:
  - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
  - 2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

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END OF SECTION 22 14 13



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SECTION 22 14 23  
STORM DRAINAGE PIPING SPECIALTIES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Roof drains.
  2. Miscellaneous storm drainage piping specialties.
  3. Cleanouts.
  4. Backwater valves.
  5. Flashing materials.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

### 1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

## PART 2 - PRODUCTS

### 2.1 METAL ROOF DRAINS

- A. Cast-Iron, Large-Sump, General-Purpose Roof Drains:
1. Standard: ASME A112.6.4, for general-purpose roof drains.
  2. Body Material: Cast iron.
  3. Dimension of Body: Nominal 15-inch diameter.
  4. Combination Flashing Ring and Gravel Stop: Not required.
  5. Flow-Control Weirs: Not required.
  6. Outlet: Bottom.
  7. Extension Collars: Required.
  8. Underdeck Clamp: Not required.
  9. Expansion Joint: Not required.
  10. Sump Receiver Plate: Not required.
  11. Dome Material: PE.
  12. Perforated Gravel Guard: Not required.
  13. Vandal-Proof Dome: Not required.
  14. Water Dam: Not required.
  15. Adjustable Extension Assembly, Top set deck plate.

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## 2.2 CLEANOUTS

### A. Floor Cleanouts:

1. Standard: ASME A112.36.2M, for heavy-duty, adjustable housing cleanouts.
2. Size: Same as connected branch.
3. Type: Heavy-duty, adjustable housing.
4. Body or Ferrule Material: Cast iron.
5. Clamping Device: Not required.
6. Closure: Plastic plug.
7. Adjustable Housing Material: Cast iron with threads set-screws or other device.
8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
9. Frame and Cover Shape: Round.
10. Top-Loading Classification: Heavy Duty.
11. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

### B. Wall Cleanouts:

1. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
2. Size: Same as connected drainage piping.
3. Body Material: as required to match connected piping.
4. Closure: Countersunk, plug.
5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
6. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
7. Wall Access: Round, nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.

## 2.3 FLASHING MATERIALS

- A. Copper Sheet: ASTM B 152/B 152M, 12 oz./sq. ft..
- B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- D. Fasteners: Metal compatible with material and substrate being fastened.
- E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- F. Solder: ASTM B 32, lead-free alloy.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

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1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
  2. Install expansion joints, if indicated, in roof drain outlets.
  3. Position roof drains for easy access and maintenance.
- B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
  3. Locate cleanouts at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
  4. Locate cleanouts at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.
- F. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

## 3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

## 3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. lead sheets, 0.0938-inch thickness or thicker. Solder joints of 4.0-lb/sq. ft. lead sheets, 0.0625-inch thickness or thinner.
  2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches and with skirt or flange extending at least 8 inches around pipe.
  2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
  3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.

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- E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

## 3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

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SECTION 22 33 00  
ELECTRIC, DOMESTIC-WATER HEATERS

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Thermostat-control, electric, tankless, domestic-water heaters.
2. Domestic-water heater accessories.

### 1.2 ACTION SUBMITTALS

#### A. Product Data: For each type and size of domestic-water heater indicated.

#### B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

### 1.3 INFORMATIONAL SUBMITTALS

#### A. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

#### B. Source quality-control reports.

#### C. Field quality-control reports.

#### D. Warranty: Sample of special warranty.

### 1.4 CLOSEOUT SUBMITTALS

#### A. Operation and maintenance data.

### 1.5 QUALITY ASSURANCE

#### A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

#### C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

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## 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
1. Warranty Periods: From date of Substantial Completion.
    - a. Electric, Tankless, Domestic-Water Heaters: Five year(s).
    - b. Compression Tanks: Five years.

## PART 2 - PRODUCTS

### 2.1 ELECTRIC, TANKLESS, domestic-WATER HEATERS

- A. Thermostat-Control, Electric, Tankless, Domestic-Water Heaters:
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. [Bosch Water Heating](#).
    - b. [Chronomite Laboratories, Inc.](#)
    - c. EEMAX.
  2. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
  3. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
    - a. Connections: ASME B1.20.1 pipe thread.
    - b. Pressure Rating: 150 psig.
    - c. Heating Element: Resistance heating system.
    - d. Temperature Control: Thermostat.
    - e. Safety Control: High-temperature-limit cutoff device or system.
    - f. Jacket: Aluminum or steel with enameled finish or plastic.
  4. Support: Bracket for wall mounting.
  5. Capacity and Characteristics:
    - a. Refer to scheduled requirements.

### 2.2 DOMESTIC-WATER HEATER ACCESSORIES

- A. Domestic-Water Compression Tanks:
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. [AMTROL Inc.](#)
    - b. [Flexcon Industries](#).

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- c. [Honeywell International Inc.](#)
  - d. [Pentair Pump Group \(The\); Myers.](#)
  - e. [Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.](#)
  - f. [State Industries.](#)
  - g. [Taco, Inc.](#)
2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
  3. Construction:
    - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
    - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    - c. Air-Charging Valve: Factory installed.
- B. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
  - C. Heat-Trap Fittings: ASHRAE 90.2.
  - D. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig- maximum outlet pressure unless otherwise indicated.
  - E. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
  - F. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
  - G. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
  - H. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
  - I. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

## 2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

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## PART 3 - EXECUTION

### 3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches above floor on wall bracket.
  - 1. Maintain manufacturer's recommended clearances.
  - 2. Arrange units so controls and devices that require servicing are accessible.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 5. Anchor domestic-water heaters to substrate.
- B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
  - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- C. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."
- E. Charge domestic-water compression tanks with air.

### 3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

### 3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

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1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
  2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

END OF SECTION 22 33 00



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SECTION 22 42 13.13  
COMMERCIAL WATER CLOSETS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Water closets.
  - 2. Flushometer valves.
  - 3. Toilet seats.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 FLOOR-MOUNTED WATER CLOSETS

- A. Water Closets: Floor mounted, top spud.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Kohler.
  - 2. Bowl:
    - a. Standards: ASME A112.19.2/CSA B45.1.
    - b. Material: Vitreous China.
    - c. Type: Siphon jet.
    - d. Style: Flushometer valve.
    - e. Height: Standard and ADA as indicated on plans.
    - f. Rim Contour: Elongated.
    - g. Water Consumption: 1.28 gal. per flush.
    - h. Spud Size and Location: NPS 1-1/2; top.
  - 3. Flushometer Valve: As scheduled on drawings.
  - 4. Toilet Seat: Hinged seat with open front, no cover.

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## 2.2 FLUSHOMETER VALVES

### A. Sensor Operated Battery Powered Flushometer Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Sloan Valve Company.
  - b. Zurn Industries, LLC; Commercial Brass and Fixtures.
  - c. American Standard.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Style: Exposed.
8. Consumption: 1.28 gal. per flush.
9. Minimum Inlet: NPS 1.
10. Minimum Outlet: NPS 1-1/4.

## 2.3 TOILET SEATS

### A. Toilet Seats:

1. Provide water-closet manufacturer's optional hinged seat, open front with no cover.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

#### B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.

#### C. Install toilet seats on water closets.

#### D. Joint Sealing:

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1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

## 3.2 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

## 3.3 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

## 3.4 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 13.13



# Downtown Bradenton Transit Station

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SECTION 22 42 13.16  
COMMERCIAL URINALS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Urinals.
  - 2. Flushometer valves.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 WALL-HUNG URINALS

- A. Urinals: Wall hung, back outlet, washout.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Kohler.
  - 2. Fixture:
    - a. Standards: ASME A112.19.2/CSA B45.1.
    - b. Material: Vitreous China.
    - c. Type: Washout with extended shields.
    - d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
    - e. Water Consumption: 0.5 gallons per flush.
    - f. Spud Size and Location: NPS 3/4, top.
    - g. Outlet Size and Location: NPS 2, back.
  - 3. Waste Fitting:
    - a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
    - b. Size: NPS 2.

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## 2.2 URINAL FLUSHOMETER VALVES

### A. Sensor Operated Battery Powered Flushometer Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Kohler Co.
  - b. Sloan Valve Company.
  - c. TOTO USA, INC.
  - d. Zurn Industries, LLC; Commercial Brass and Fixtures.
  - e. American Standard.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Style: Exposed.
8. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
9. Trip Mechanism: Battery-powered electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Consumption: 0.5 gal. per flush.
11. Minimum Inlet: NPS 3/4.
12. Minimum Outlet: NPS 1-1/4.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
- B. Examine walls and floors for suitable conditions where urinals will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

#### A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.

#### B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.

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2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

## C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

## D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

## E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.
3. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

### 3.3 CONNECTIONS

- A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.
- B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to urinals, allow space for service and maintenance.

### 3.4 ADJUSTING

- A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

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### 3.5 CLEANING AND PROTECTION

- A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed urinals and fittings.
- C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 13.16

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SECTION 22 42 16.13  
COMMERCIAL LAVATORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Lavatories.
2. Faucets.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.
  1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
    - a. Servicing and adjustments of automatic faucets.

## PART 2 - PRODUCTS

### 2.1 STAINLESS STEEL, WALL-MOUNTED LAVATORIES

#### A. Lavatory: Vitreous china, wall mounted, with back.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Kohler.
2. Fixture:
  - a. Standard: ASME A112.19.2/CSA B45.1.
  - b. Type: For wall hanging.

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- c. Nominal Size: Rectangular, 22 by 18 inches.
  - d. Faucet-Hole Punching: Single Hole.
  - e. Faucet-Hole Location: Top.
  - f. Construction: Vitreous China.
3. Faucet: Sensor faucet with single hole deck mounting. Faucet to meter a single cold water supply 0.5 gpm spray outlet.

## 2.2 METAL CONSTRUCTION, MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Sensor-type, single-control mixing, solid-metal valve.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. American Standard America.
    - b. Chicago Faucets.
    - c. Delta Faucet Company.
    - d. Kohler Co.
    - e. Zurn Industries, LLC; Commercial Brass and Fixtures.
    - f. Symmons.
  2. Standard: ASME A112.18.1/CSA B125.1.
  3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
  4. Body Type: Centerset.
  5. Body Material: Commercial, solid metal.
  6. Finish: Polished chrome plate.
  7. Maximum Flow Rate: 1.5 gpm.
  8. Mounting Type: Deck, exposed.
  9. Valve Handle(s): Sensor faucet.
  10. Spout: Rigid type.
  11. Spout Outlet: Laminar Flow Control.

## 2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:

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1. NPS 3/8.
2. Chrome-plated, soft-copper flexible tube riser.

## 2.4 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.
- C. Trap:
  1. Size: NPS 1-1/2 by NPS 1-1/4.
  2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated, brass or steel wall flange.
  3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

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## 3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

## 3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

## 3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.13

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SECTION 22 42 16.16  
COMMERCIAL SINKS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Countertop sinks.
  - 2. Sink faucets.
  - 3. Laminar-flow, faucet-spout outlets.
  - 4. Supply fittings.
  - 5. Waste fittings.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

## PART 2 - PRODUCTS

### 2.1 COUNTERTOP SINKS

- A. Drop-in Countertop Stainless Steel Sinks.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Elkay.
    - b. Dayton
    - c. Just
  - 2. Fixture:
    - a. Standard: ASME A112.19.3-2008.
    - b. Material: 18 ga. Type 304 Stainless Steel.
    - c. Nominal Size: Refer to scheduled requirements.
  - 3. Mounting: Top mount.

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4. Faucet: Refer to scheduled requirements.

## 2.2 SINK FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.
- B. Sink Faucets: Manual type. Refer to Plumbing Fixture Schedule for additional requirements.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. American Standard America.
    - b. Chicago Faucets.
    - c. Delta Faucet Company.
    - d. Elkay Manufacturing Co.
    - e. Just Manufacturing.
    - f. Zurn Industries, LLC; Commercial Brass and Fixtures.

## 2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Wheel handle.
- F. Risers:
  1. NPS 3/8
  2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

## 2.4 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.
- C. Trap:
  1. Size: NPS 1-1/2.
  2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated brass or steel wall flange.

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3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- thick stainless-steel tube to wall; and stainless-steel wall flange.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.
- B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install sinks level and plumb according to roughing-in drawings.
- B. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.
- C. Install water-supply piping with stop on each supply to each sink faucet.
  1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
  2. Install stops in locations where they can be easily reached for operation.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."
- E. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

### 3.3 CONNECTIONS

- A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

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### 3.4 ADJUSTING

- A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

### 3.5 CLEANING AND PROTECTION

- A. After completing installation of sinks, inspect and repair damaged finishes.
- B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed sinks and fittings.
- D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.16

# Downtown Bradenton Transit Station

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SECTION 22 47 13  
DRINKING FOUNTAINS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes drinking fountains and related components.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of drinking fountains.

### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For drinking fountains to include in maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 DRINKING FOUNTAINS

- A. Drinking Fountains: wall mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Haws.
2. Standards:
  - a. Comply with ANSI A117.1.
  - b. Comply with NSF 61.
  - c. Americans with Disabilities Act of 1990.
3. Receptor Shape: Round.
4. Back Panel: Stainless-steel wall plate behind drinking fountain.
5. Bubblers: Two, with integral laminar flow, located on deck.
6. Control: Push button.
7. Drain: Grid type with NPS 1-1/4 tailpiece.
8. Supply Piping: NPS 3/8 with shutoff valve.
9. Drain Piping: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
10. Support: Galvanized frame and 10 gauge surface plate.
11. Construction: Self-contained Vandal Resistance, 18g. Stainless Steel (Type 304).

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## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine walls and floors for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Set pedestal drinking fountains on floor.
- C. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."
- G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."
- H. Adjust fixture flow regulators for proper flow and stream height.

### 3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping." Division 15 Section "Domestic Water Piping."
- C. Install ball, gate, or globe shutoff valve on water supply to each fixture. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping." Division 15 Section "General-Duty Valves for Plumbing Piping."

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- D. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."Division 15 Section "Sanitary Waste and Vent Piping."

### 3.4 CLEANING

- A. After installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 47 13



**Division 23**  
Heating, Ventilating and Air Conditioning



# Downtown Bradenton Transit Station

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SECTION 23 05 00  
COMMON WORK RESULTS FOR HVAC

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Equipment installation requirements common to equipment sections.
8. Concrete bases.
9. Supports and anchorages.

### 1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

### 1.3 SUBMITTALS

- A. Welding certificates.

### 1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

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- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.2 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
  - 1. CPVC Piping: ASTM F 493.
  - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

### 2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.

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- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

## 2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

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## 2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

## 2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.

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- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

## 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

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- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

## 3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

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## 3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

## 3.5 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
  - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.

## 3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

## 3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

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### 3.8 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 23 05 00

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## SECTION 23 05 13 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

#### 1.2 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
  - 1. Motor controllers.
  - 2. Torque, speed, and horsepower requirements of the load.
  - 3. Ratings and characteristics of supply circuit and required control sequence.
  - 4. Ambient and environmental conditions of installation location.

### PART 2 - PRODUCTS

#### 2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.

#### 2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 100 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

#### 2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.

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- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
  - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
  - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Rotor: Random-wound, squirrel cage.
- F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- G. Temperature Rise: Match insulation rating.
- H. Insulation: Class F unless otherwise indicated.
- I. Code Letter Designation:
  - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
  - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

## 2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
  - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
  - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
  - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
  - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

## 2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
  - 1. Permanent-split capacitor.
  - 2. Split phase.
  - 3. Capacitor start, inductor run.
  - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

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- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 05 13



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SECTION 23 05 93  
TESTING, ADJUSTING, AND BALANCING FOR HVAC

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Balancing Air Systems:
    - a. Constant-volume air systems.
    - b. Variable-air-volume systems.
  - 2. Balancing Hydronic Piping Systems:
    - a. Constant-flow hydronic systems.
    - b. Variable-flow hydronic systems.

### 1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

### 1.3 SUBMITTALS

- A. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- B. Certified TAB reports.

### 1.4 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.
  - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC or NEBB.
  - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC or NEBB as a TAB technician.
- B. Certify TAB field data reports and perform the following:

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1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
  1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- J. Examine operating safety interlocks and controls on HVAC equipment.

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- K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

## 3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
  - 1. Permanent electrical-power wiring is complete.
  - 2. Automatic temperature-control systems are operational.
  - 3. Equipment and duct access doors are securely closed.
  - 4. Balance, smoke, and fire dampers are open.
  - 5. Isolating and balancing valves are open and control valves are operational.
  - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 7. Windows and doors can be closed so indicated conditions for system operations can be met.

## 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" ASHRAE 111 NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
  - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

## 3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. For variable-air-volume systems, develop a plan to simulate diversity.

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- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.

## 3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
  - 2. Measure fan static pressures as follows to determine actual static pressure:
    - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet or through the flexible connection.
    - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
  - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Report the cleanliness status of filters and the time static pressures are measured.
  - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
  - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
  - 6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.

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7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
  2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
  3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  2. Adjust patterns of adjustable outlets for proper distribution without drafts.

## 3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
  2. Motor horsepower rating.
  3. Motor rpm.
  4. Efficiency rating.
  5. Nameplate and measured voltage, each phase.
  6. Nameplate and measured amperage, each phase.
  7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

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## 3.7 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.
- B. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- C. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

## 3.8 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
  - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
  - 1. Fan curves.
  - 2. Manufacturers' test data.
  - 3. Field test reports prepared by system and equipment installers.
  - 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
  - 1. Title page.
  - 2. Name and address of the TAB contractor.
  - 3. Project name.
  - 4. Project location.
  - 5. Architect's name and address.
  - 6. Engineer's name and address.
  - 7. Contractor's name and address.
  - 8. Report date.
  - 9. Signature of TAB supervisor who certifies the report.
  - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  - 11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.

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- c. Description of system operation sequence if it varies from the Contract Documents.
  - 12. Nomenclature sheets for each item of equipment.
  - 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  - 14. Notes to explain why certain final data in the body of reports vary from indicated values.
  - 15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Fan drive settings including settings and percentage of maximum pitch diameter.
    - e. Settings for supply-air, static-pressure controller.
    - f. Other system operating conditions that affect performance.
  - D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
    - 1. Quantities of outdoor, supply, return, and exhaust airflows.
    - 2. Duct, outlet, and inlet sizes.
- 3.9 ADDITIONAL TESTS
- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
  - B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93



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SECTION 23 07 13  
DUCT INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes insulating the following duct services:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, concealed return located in unconditioned space.
  - 3. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
  
- B. Related Sections:
  - 1. Division 23 Section "HVAC Equipment Insulation."
  - 2. Division 23 Section "HVAC Piping Insulation."
  - 3. Division 23 Section "Metal Ducts" for duct liners.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
  
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 3. Detail application of field-applied jackets.
  - 4. Detail application at linkages of control devices.

### 1.3 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

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## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; SoftTouch Duct Wrap.
    - b. Johns Manville; Microlite.
    - c. Knauf Insulation; Friendly Feel Duct Wrap.
    - d. Manson Insulation Inc.; Alley Wrap.
    - e. Owens Corning; SOFTR All-Service Duct Wrap.
- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.
    - d. Knauf Insulation; Insulation Board.
    - e. Manson Insulation Inc.; AK Board.
    - f. Owens Corning; Fiberglas 700 Series.

### 2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

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1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
    - b. Eagle Bridges - Marathon Industries; 225.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
    - d. Mon-Eco Industries, Inc.; 22-25.
  2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  3. Use adhesive that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    - b. Eagle Bridges - Marathon Industries; 225.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
    - d. Mon-Eco Industries, Inc.; 22-25.
  2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  3. Use adhesive that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

## 2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    - b. Vimasco Corporation; 749.
  2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
  3. Service Temperature Range: Minus 20 to plus 180 deg F.

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4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
  - b. Eagle Bridges - Marathon Industries; 550.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
  - d. Mon-Eco Industries, Inc.; 55-50.
  - e. Vimasco Corporation; WC-1/WC-5.
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

## 2.4 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
  - b. Eagle Bridges - Marathon Industries; 405.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
  - d. Mon-Eco Industries, Inc.; 44-05.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.

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5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

## 2.5 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
  2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
  3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
  4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
  5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

## 2.6 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
    - b. Vimasco Corporation; Elastafab 894.

## 2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

## 2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 428 AWF ASJ.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.

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- c. Compac Corporation; 104 and 105.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
  2. Width: 3 inches.
  3. Thickness: 11.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.
  7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 491 AWF FSK.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    - c. Compac Corporation; 110 and 111.
    - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
  2. Width: 3 inches.
  3. Thickness: 6.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.
  7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 488 AWF.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
    - c. Compac Corporation; 120.
    - d. Venture Tape; 3520 CW.
  2. Width: 2 inches.
  3. Thickness: 3.7 mils.
  4. Adhesion: 100 ounces force/inch in width.
  5. Elongation: 5 percent.
  6. Tensile Strength: 34 lbf/inch in width.

## 2.9 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with closed seal.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ITW Insulation Systems; Gerrard Strapping and Seals.
    - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
- B. Insulation Pins and Hangers:

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1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
    - 2) GEMCO; Perforated Base.
    - 3) Midwest Fasteners, Inc.; Spindle.
  - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  - c. Spindle: Zinc-coated, low-carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) GEMCO; Nylon Hangers.
    - 2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
  - b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
  - c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
    - 2) GEMCO; Peel & Press.
    - 3) Midwest Fasteners, Inc.; Self Stick.
  - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  - c. Spindle: Zinc-coated, low-carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
  - d. Adhesive-backed base with a peel-off protective cover.
4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

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- a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) AGM Industries, Inc.; RC-150.
    - 2) GEMCO; R-150.
    - 3) Midwest Fasteners, Inc.; WA-150.
    - 4) Nelson Stud Welding; Speed Clips.
  - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) GEMCO.
    - 2) Midwest Fasteners, Inc.
  - C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
  - D. Wire: 0.062-inch soft-annealed, galvanized steel.
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - a. C & F Wire.
- 2.10 CORNER ANGLES
- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
  - B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

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- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

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- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

## 3.3 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
  - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
  - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
  - 1. Comply with requirements in Division 07 for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
  - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
  - 2. Seal penetrations through fire-rated assemblies.

## 3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
  - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.

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2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.
    - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
  5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
  6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

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- a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
  - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
  - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
  - d. Do not overcompress insulation during installation.
  - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
  - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

## 3.5 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

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## 3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies.

## 3.7 FINISHES

- A. Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
  - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

## 3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

## 3.9 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, concealed return located in unconditioned space.
  - 3. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
- B. Items Not Insulated:
  - 1. Factory-insulated flexible ducts.
  - 2. Factory-insulated plenums and casings.
  - 3. Flexible connectors.

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4. Vibration-control devices.
5. Factory-insulated access panels and doors.

## 3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket or board, 2 inches thick and 1.5-lb/cu. ft. nominal density.
- B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket or board, 2 inches thick and 1.5-lb/cu. ft. nominal density.
- C. Concealed, Outdoor-Air Duct and Plenum Insulation: Mineral-fiber blanket or board, 2 inches thick and 1.5-lb/cu. ft. nominal density.

END OF SECTION 23 07 13

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SECTION 23 31 13  
METAL DUCTS

## 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 metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg. Metal ducts include the following:
  - 1. Rectangular ducts and fittings.
  - 2. Single-wall, round spiral-seam ducts and formed fittings.
- B. Related Sections include the following:
  - 1. Division 23 for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

### 1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

### 1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

### 1.5 SUBMITTALS

- A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot scale. Show fabrication and installation details for metal ducts.
  - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
  - 2. Duct layout indicating sizes and pressure classes. (Coordinate with other trades and with ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, existing and new fire sprinklers, access panels, and special moldings.).
  - 3. Elevations of top and bottom of ducts.

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4. Dimensions of main duct runs from building grid lines.
5. Fittings.
6. Reinforcement and spacing.
7. Seam and joint construction.
8. Penetrations through fire-rated and other partitions.
9. Equipment installation based on equipment being used on Project.
10. Duct accessories, including access doors and panels.
11. Hangers and supports, including methods for duct and building attachment and vibration isolation.

B. Welding certificates.

C. Field quality-control test reports.

## 1.6 QUALITY ASSURANCE

A. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria".

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel," for hangers and supports.

C. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Ch. 3, "Duct System," for range hood ducts, unless otherwise indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

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- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.3 DUCT LINER

- A. Duct liner is not permitted.

## 2.4 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- B. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.
- C. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
- D. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.
- E. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.
- F. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- G. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

## 2.5 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
  - 1. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
  - 2. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

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- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

## 2.6 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
  - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
  - 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
  - 1. Available Manufacturers:
    - a. Ductmate Industries, Inc.
    - b. Nexus Inc.
    - c. Ward Industries, Inc.
- C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
  - 1. Available Manufacturers:
    - a. Ductmate Industries, Inc.
    - b. Lockformer.
  - 2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
  - 3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
- D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

## 2.7 ROUND DUCT AND FITTING FABRICATION

- A. Round, Longitudinal- and Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Duct Joints:

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1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
2. Ducts 21 to 72 Inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
3. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
  - a. Available Manufacturers:
    - 1) Ductmate Industries, Inc.
    - 2) Lindab Inc.
- C. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.
- D. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.
- E. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:
  1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
  2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:
    - a. Ducts 3 to 36 Inches in Diameter: 0.034 inch.
    - b. Ducts 37 to 50 Inches in Diameter: 0.040 inch.
    - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
    - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
  3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
    - a. Ducts 3 to 26 Inches in Diameter: 0.034 inch.
    - b. Ducts 27 to 50 Inches in Diameter: 0.040 inch.
    - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
    - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
  4. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.
  5. Round Elbows 8 Inches and Less in Diameter: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
  6. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.

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7. Round Elbows Larger Than 14 Inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows unless space restrictions require mitered elbows.
8. Die-Formed Elbows for Sizes through 8 Inches in Diameter and All Pressures 0.040 inch thick with 2-piece welded construction.
9. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
10. Pleated Elbows for Sizes through 14 Inches in Diameter and Pressures through 10-Inch wg: 0.022 inch.

## PART 3 - EXECUTION

### 3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
  1. Supply Ducts: 2-inch wg.
  2. Supply Ducts (before Air Terminal Units): 3-inch wg.
  3. Supply Ducts (after Air Terminal Units): 2-inch wg.
  4. Supply Ducts (in Mechanical Equipment Rooms): 4-inch wg.
  5. Return Ducts (Negative Pressure, in Mechanical Rooms): 3-inch wg.
  6. Return Ducts (Negative Pressure): 2-inch wg.
  7. Exhaust and Outside Air Ducts (Negative Pressure): 2-inch wg.
- B. All ducts shall be galvanized steel or as otherwise noted.

### 3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Install round ducts in lengths not less than 12 feet unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

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- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- N. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
- O. Paint interiors of metal ducts for 24 inches upstream of registers and grilles where interior of duct can be seen through register or grille. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified in other Divisions.

## 3.3 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
  - 1. For pressure classes lower than 2-inch wg, seal transverse joints.
- B. Seal ducts before external insulation is applied.

## 3.4 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet and at each floor.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

## 3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Division 23.

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- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

## 3.6 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
  - 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
  - 2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
  - 3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
  - 4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

## 3.7 CLEANING NEW SYSTEMS

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
  - 1. Create other openings to comply with duct standards.
  - 2. Disconnect flexible ducts as needed for cleaning and inspection.
  - 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
  - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
  - 4. Coils and related components.
  - 5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
  - 6. Supply-air ducts, dampers, actuators, and turning vanes.
- E. Mechanical Cleaning Methodology:

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1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts or duct accessories.
4. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.

F. Cleanliness Verification:

1. Visually inspect metal ducts for contaminants.
2. Where contaminants are discovered, re-clean and reinspect ducts.

END OF SECTION 23 31 13



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SECTION 23 33 00  
AIR DUCT ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Backdraft and pressure relief dampers.
  2. Manual volume dampers.
  3. Control dampers.
  4. Flange connectors.
  5. Turning vanes.
  6. Duct-mounted access doors.
  7. Flexible connectors.
  8. Flexible ducts.
  9. Duct accessory hardware.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
    - a. Special fittings.
    - b. Manual volume damper installations.
    - c. Control damper installations.
    - d. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and maintenance data.

### 1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90.
  - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

### 2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Air Balance Inc.; a division of Mestek, Inc.
  - 2. American Warming and Ventilating; a division of Mestek, Inc.
  - 3. Cesco Products; a division of Mestek, Inc.
  - 4. Duro Dyne Inc.
  - 5. Greenheck Fan Corporation.
  - 6. Lloyd Industries, Inc.
  - 7. Nailor Industries Inc.
  - 8. NCA Manufacturing, Inc.
  - 9. Pottorff; a division of PCI Industries, Inc.
  - 10. Ruskin Company.
  - 11. SEMCO Incorporated.
  - 12. Vent Products Company, Inc.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2000 fpm.
- D. Maximum System Pressure: 1-inch wg.
- E. Frame: 0.052-inch- thick, galvanized sheet steel, with welded corners and mounting flange.
- F. Blades: Multiple single-piece blades, center-pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.
- G. Blade Action: Parallel.
- H. Blade Seals: Extruded vinyl, mechanically locked.

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- I. Blade Axles:
  - 1. Material: Galvanized steel.
  - 2. Diameter: 0.20 inch.
- J. Tie Bars and Brackets: Galvanized steel.
- K. Return Spring: Adjustable tension.
- L. Bearings: Steel ball or synthetic pivot bushings.
- M. Accessories:
  - 1. Adjustment device to permit setting for varying differential static pressure.
  - 2. Counterweights and spring-assist kits for vertical airflow installations.
  - 3. Electric actuators.
  - 4. Chain pulls.
  - 5. Screen Mounting: Front mounted in sleeve.
    - a. Sleeve Thickness: 20-gage minimum.
    - b. Sleeve Length: 6 inches minimum.
  - 6. Screen Mounting: Rear mounted.
  - 7. Screen Material: Galvanized steel.
  - 8. Screen Type: Insect.
  - 9. 90-degree stops.

## 2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Air Balance Inc.; a division of Mestek, Inc.
    - b. American Warming and Ventilating; a division of Mestek, Inc.
    - c. Flexmaster U.S.A., Inc.
    - d. McGill AirFlow LLC.
    - e. METALAIRE, Inc.
    - f. Nailor Industries Inc.
    - g. Pottorff; a division of PCI Industries, Inc.
    - h. Ruskin Company.
    - i. Trox USA Inc.
    - j. Vent Products Company, Inc.
  - 2. Standard leakage rating, with linkage outside airstream.
  - 3. Suitable for horizontal or vertical applications.
  - 4. Frames:
    - a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
  - 5. Blades:

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- a. Multiple or single blade.
  - b. Parallel- or opposed-blade design.
  - c. Stiffen damper blades for stability.
  - d. Galvanized-steel, 0.064 inch thick.
6. Blade Axles: Galvanized steel.
7. Bearings:
- a. Oil-impregnated bronze.
  - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.

## 2.4 CONTROL DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Warming and Ventilating; a division of Mestek, Inc.
  2. Arrow United Industries; a division of Mestek, Inc.
  3. Cesco Products; a division of Mestek, Inc.
  4. Duro Dyne Inc.
  5. Flexmaster U.S.A., Inc.
  6. Greenheck Fan Corporation.
  7. Lloyd Industries, Inc.
  8. M&I Air Systems Engineering; Division of M&I Heat Transfer Products Ltd.
  9. McGill AirFlow LLC.
  10. METALAIRE, Inc.
  11. Metal Form Manufacturing, Inc.
  12. Nailor Industries Inc.
  13. NCA Manufacturing, Inc.
  14. Ruskin Company.
  15. Vent Products Company, Inc.
  16. Young Regulator Company.
- B. Frames:
1. Hat shaped.
  2. Galvanized-steel channels, 0.064 inch thick.
  3. Mitered and welded corners.
- C. Blades:
1. Multiple blade with maximum blade width of 8 inches.
  2. Parallel- and opposed-blade design.
  3. Galvanized steel.
  4. 0.064 inch thick.
  5. Blade Edging: Closed-cell neoprene edging.
  6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- D. Blade Axles: 1/2-inch- diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

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1. Operating Temperature Range: From minus 40 to plus 200 deg F.

E. Bearings:

1. Oil-impregnated bronze.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

## 2.5 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

- C. Material: Galvanized steel.

- D. Gage and Shape: Match connecting ductwork.

## 2.6 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."

- E. Vane Construction: Double wall.

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- F. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

## 2.7 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Flexmaster U.S.A., Inc.
5. Greenheck Fan Corporation.
6. McGill AirFlow LLC.
7. Nailor Industries Inc.
8. Pottorff; a division of PCI Industries, Inc.
9. Ventfabrics, Inc.
10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."

1. Door:
  - a. Double wall, rectangular.
  - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
  - c. Vision panel.
  - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
  - e. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
  - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
  - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
  - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
  - d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

- C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 10-inch wg.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.

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9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

## 2.8 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ductmate Industries, Inc.
  2. Flame Gard, Inc.
  3. 3M.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.
- D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

## 2.9 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ductmate Industries, Inc.
  2. Duro Dyne Inc.
  3. Ventfabrics, Inc.
  4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  1. Minimum Weight: 26 oz./sq. yd..
  2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
  1. Minimum Weight: 24 oz./sq. yd..
  2. Minimum Tensile Strength: 500 lbf/inch in the warp and 440 lbf/inch in the filling.
  3. Service Temperature: Minus 50 to plus 250 deg F.

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- G. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
  - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
  - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
  - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

## 2.10 FLEXIBLE DUCTS (Flexible duct shall not exceed 7'-0")

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Flexmaster U.S.A., Inc.
  - 2. McGill AirFlow LLC.
  - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
  - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
  - 2. Maximum Air Velocity: 4000 fpm.
  - 3. Temperature Range: Minus 10 to plus 160 deg F.
  - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.
- C. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
  - 1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
  - 2. Maximum Air Velocity: 4000 fpm.
  - 3. Temperature Range: Minus 20 to plus 175 deg F.
  - 4. Insulation R-Value: Comply with ASHRAE/IESNA 90.1-2004.
- D. Flexible Duct Connectors:
  - 1. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size.

## 2.11 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel.
- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts.
  - 1. Install steel volume dampers in steel ducts.
  - 2. Install volume dampers in each branch duct (supply, return, exhaust, and outdoor air) and as shown on drawings for ease of testing, adjusting, and balancing.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
  - 1. Downstream control dampers, backdraft dampers, and equipment.
  - 2. Upstream from turning vanes.
  - 3. Control devices requiring inspection.
  - 4. Elsewhere as indicated.
- H. Install access doors with swing against duct static pressure.
- I. Access Door Sizes:
  - 1. One-Hand or Inspection Access: 8 by 5 inches.
  - 2. Two-Hand Access: 12 by 6 inches.
  - 3. Head and Hand Access: 18 by 10 inches.
  - 4. Head and Shoulders Access: 21 by 14 inches.
  - 5. Body Access: 25 by 14 inches.
  - 6. Body plus Ladder Access: 25 by 17 inches.
- J. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- K. Install flexible connectors to connect ducts to equipment.
- L. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- M. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

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- N. Connect flexible ducts to metal ducts with draw bands.
- O. Install duct test holes where required for testing and balancing purposes.

## 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Operate dampers to verify full range of movement.
  - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
  - 3. Inspect turning vanes for proper and secure installation.

END OF SECTION 23 33 00

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SECTION 23 37 13  
DIFFUSERS, REGISTERS, AND GRILLES

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Adjustable bar registers and grilles.
3. Fixed face registers and grilles.

#### B. Related Sections:

1. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

### 1.2 SUBMITTALS

#### A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

#### B. Samples: For each exposed product and for each color and texture specified.

## PART 2 - PRODUCTS

### 2.1 CEILING DIFFUSERS

#### A. Rectangular and Square Ceiling Diffusers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Krueger.
  - b. METALAIRE, Inc.
  - c. Price Industries.
  - d. Titus.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. Finish: Baked enamel, white.
5. Dampers: Radial opposed blade.
6. Accessories:

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- a. Equalizing grid.
- b. Plaster ring.
- c. Safety chain.
- d. Wire guard.
- e. Sectorizing baffles.
- f. Operating rod extension.

## 2.2 REGISTERS AND GRILLES

### A. Adjustable Bar Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Krueger.
  - b. METALAIRE, Inc.
  - c. Price Industries.
  - d. Titus.
2. Material: Aluminum.
3. Finish: Baked enamel, white.
4. Damper Type: Adjustable opposed blade.

### B. Adjustable Bar Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Krueger.
  - b. METALAIRE, Inc.
  - c. Price Industries.
  - d. Titus.
2. Material: Aluminum.
3. Finish: Baked enamel, white.

### C. Fixed Face Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Krueger.
  - b. Price Industries.
  - c. Titus.
2. Material: Aluminum.
3. Finish: Baked enamel, white.

### D. Fixed Face Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Krueger.

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- b. Price Industries.
  - c. Titus.
- 2. Material: Aluminum.
  - 3. Finish: Baked enamel, white.

## 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.2 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13



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## SECTION 23 74 13 PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
  - 1. Direct-expansion cooling.
  - 2. Electric-heating coils.
  - 3. Integral, space temperature controls.
  - 4. Roof curbs.

#### 1.2 DEFINITIONS

- A. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.
- B. Supply-Air Fan: The fan providing supply-air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- C. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Performance:
  - 1. Basic Wind Speed: 130 mph.
  - 2. Minimum 10 lb/sq. ft multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Wiring Diagrams: Power, signal, and control wiring.

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## 1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.
- B. Warranty.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

## 1.7 QUALITY ASSURANCE

- A. ARI Compliance:
  - 1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
  - 2. Comply with ARI 270 for testing and rating sound performance for RTUs.
- B. ASHRAE Compliance:
  - 1. Comply with ASHRAE 15 for refrigerant system safety.
  - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
  - 3. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- D. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.
- E. UL Compliance: Comply with UL 1995.
- F. 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.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
  - 2. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than three years from date of Substantial Completion.
  - 3. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Carrier Corporation.
  2. Lennox Industries Inc.
  3. McQuay International.
  4. Trane; American Standard Companies, Inc.
  5. YORK International Corporation.

### 2.2 CASING

- A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
- B. Condensate Drain Pans: Formed sections of galvanized-steel sheet, a minimum of 2 inches deep.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

### 2.3 FANS

- A. Direct-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.
- B. Belt-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.
- C. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.
- D. Fan Motor: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

### 2.4 COILS

- A. Supply-Air Refrigerant Coil:
1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
  2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
  3. Coil Split: Interlaced.

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4. Condensate Drain Pan: Galvanized steel with corrosion-resistant coating formed with pitch and drain connections complying with ASHRAE 62.1.

B. Electric-Resistance Heating:

1. Open Heating Elements: Resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
2. Overtemperature Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box.
3. Overcurrent Protection: Manual-reset thermal cutouts, factory wired in each heater stage.
4. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:
  - a. Step Controller: Pilot lights and override toggle switch for each step.
  - b. SCR Controller: Pilot lights operate on load ratio, a minimum of five steps.
  - c. Time-delay relay.
  - d. Airflow proving switch.

## 2.5 REFRIGERANT CIRCUIT COMPONENTS

A. Number of Refrigerant Circuits: One.

- B. Compressor: Hermetic, reciprocating Semihermetic, reciprocating, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.

C. Refrigeration Specialties:

1. Refrigerant: R-410A.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.

## 2.6 AIR FILTRATION

- A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Pleated: Minimum 90 percent arrestance, and MERV 7.

## 2.7 DAMPERS

- A. Outdoor-Air Damper: Linked damper blades, for 0 to 25 percent outdoor air, with manual damper filter.

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- B. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
  - 1. Damper Motor: Modulating with adjustable minimum position.
  - 2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

## 2.8 ELECTRICAL POWER CONNECTION

- A. Provide for single connection of power to unit with control-circuit transformer with built-in overcurrent protection.

## 2.9 ACCESSORIES

- A. Coil guards of painted, galvanized-steel wire.
- B. Hail guards of galvanized steel, painted to match casing.

## 2.10 ROOF CURBS

- A. Roof curbs with vibration isolators and wind restraints.
- B. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.
  - 1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
    - a. Materials: ASTM C 1071, Type I or II.
  - 2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
    - a. Liner Adhesive: Comply with ASTM C 916, Type I.
    - b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
    - c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
    - d. Liner Adhesive: Comply with ASTM C 916, Type I.
- C. Curb Height: 14 inches.
- D. Wind Restraints: Metal brackets compatible with the curb and casing, painted to match RTU, used to anchor unit to the curb, and designed for loads at Project site.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.
- B. Install wind restraints according to manufacturer's written instructions.
- C. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain.
- D. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
  - 1. Install ducts to termination at top of roof curb.
  - 2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
  - 3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
  - 4. Install return-air duct continuously through roof structure.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.
- C. Tests and Inspections:
  - 1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
  - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.

### 3.3 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.

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- B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 23 74 13



**Division 26**  
Electrical



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SECTION 26 05 00  
COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 - GENERAL

1.1 The electrical work included in all other divisions are the responsibility of the contractor performing the Division 26 work unless noted otherwise.

### 1.2 PROJECT OVERVIEW

A. Provide power, lighting and special systems for the construction of a bus transfer building which includes art display areas..

### 1.3 SCOPE

A. The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

B. Section Includes:

#### 1. GENERAL

- a. Project Overview
- b. Scope
- c. Related Work
- d. Reference Standards
- e. Regulatory Requirements
- f. Quality Assurance
- g. Continuity of Existing Services and Systems
- h. Protection of Finished Surfaces
- i. Approved Electrical Testing Laboratories
- j. Sleeves for Raceways and Cables
- k. Sleeve Seals
- l. Grout
- m. Sealing and Firestopping
- n. Owner Furnished Equipment
- o. Work by Owner
- p. Provisions for Future Work
- q. Intent
- r. Omissions
- s. Submittals
- t. Salvage Materials
- u. Certificates and Inspections
- v. Operating and Maintenance Data
- w. Training of Owner Personnel
- x. Record Drawings

#### 2. PRODUCTS

- a. Access Panels and Doors
- b. Identification

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- c. Sealing

## 3. EXECUTION

- a. Excavation and Backfill
- b. Concrete Work
- c. Cutting and Patching
- d. Building Access
- e. Equipment Access
- f. Coordination
- g. Sleeves: Installation for Electrical Penetrations
- h. Sealing
- i. Housekeeping and Clean Up

## 4. RELATED WORK

- a. Applicable provisions of Division 01 govern work under this Section.

## 5. REFERENCE STANDARDS

- a. Abbreviations of standards organizations referenced in this and other sections are as follows:

- 1) ANSI American National Standards Institute
- 2) ASTM American Society for Testing and Materials
- 3) EPA Environmental Protection Agency
- 4) ETL Electrical Testing Laboratories, Inc.
- 5) IEEE Institute of Electrical and Electronics Engineers
- 6) IES Illuminating Engineering Society
- 7) ISA Instrument Society of America
- 8) NBS National Bureau of Standards
- 9) NEC National Electric Code
- 10) NEMA National Electrical Manufacturers Association
- 11) NESC National Electrical Safety Code
- 12) NFPA National Fire Protection Association
- 13) UL Underwriters Laboratories Inc.

## 6. REGULATORY REQUIREMENTS

- a. All work and materials are to conform in every detail to applicable rules and requirements of the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA).
- b. All Division 26 work shall be done under the direction of a currently certified State of Florida Certified Master Electrician.

## 7. QUALITY ASSURANCE

- a. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.

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- b. Manufacturer references used herein are intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.
- c. All materials, except medium voltage equipment and components, shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards, if available, applicable, and approved by DSF, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system, except for medium voltage equipment and components, shall be so labeled.

## 8. CONTINUITY OF EXISTING SERVICES AND SYSTEMS

- a. No outages shall be permitted on existing systems except at the time and during the interval specified by the Owner and Architect. This will require written approval. Any outage must be scheduled when the interruption causes the least interference with normal institutional schedules and business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours. If required by the serving utility, include these costs in bid.
- b. This Contractor shall restore any circuit interrupted as a result of this work to proper operation as soon as possible.

## 9. PROTECTION OF FINISHED SURFACES

- a. Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

## 10. APPROVED ELECTRICAL TESTING LABORATORIES

- a. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:
  - 1) Underwriters Laboratories Inc.
  - 2) Electrical Testing Laboratories, Inc.

## 1.4 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  - 1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
    - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

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## 1.5 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
  - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
  - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 1.6 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 1.7 SEALING

- 1. Sealing of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening.

## 1.8 WORK BY OWNER

- A. Asbestos abatement and PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the Owner under separate contract.
- B. Electrical testing not described in these contract documents will be by the Owner under separate contract.

## 1.9 INTENT

- A. The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.
- B. If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, or most closely fits the Owners intent). Refer to the General Conditions of the Contract for further clarification.

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- C. It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.
- D. All sizes as given are minimum except as noted.
- E. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the Owner's and Architect's inspections, tests and approval from the commencement until the acceptance of the completed work.
- F. Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

## 1.10 OMISSIONS

- A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the Owner and Architect to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

## 1.11 SUBMITTALS

- A. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.
- B. On request from the Architect, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.
- C. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.
- D. The submittals must be approved before fabrication is authorized.
- E. Submit sufficient quantities of submittals to allow the following distribution:
  - 1. Operating and Maintenance Manuals 3 copies
  - 2. Architect 2 copies
  - 3. Engineer 1 copy

## 1.12 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner and Architect before proceeding.

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- C. Tools, materials and equipment shall be confined to areas designated by the Owner and Architect.

## 1.13 ASBESTOS ABATEMENT

- A. The Owner is responsible for identifying Asbestos Containing Materials (ACMs) in State buildings. Contractor shall not supply or install any materials that contain any amount of asbestos.

## 1.14 WORK SEQUENCE AND SCHEDULING

- A. Install work in phases to accommodate user Owner's occupancy requirements. During the construction period coordinate electrical schedule and operations with the Owner and Architect.

## 1.15 WORK BY OTHER TRADES

- A. Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this Trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.
- B. Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

## 1.16 SALVAGE MATERIALS

- A. No materials removed from this project shall be reused. All materials removed shall become the property of and shall be disposed of by the Contractor.

## 1.17 CERTIFICATES AND INSPECTIONS

- A. Obtain and pay for all required installation inspections.

## 1.18 OPERATION AND MAINTENANCE DATA

- A. Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:
  1. Copies of all approved submittals.
  2. Manufacturer's wiring diagrams for electrically powered equipment.
  3. Records of tests performed to certify compliance with system requirements.
  4. Certificates of inspection by regulatory agencies.
  5. Parts lists for manufactured equipment.
  6. Preventative maintenance recommendations.
  7. Warranties.

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8. Additional information as indicated in the technical specification sections.

## 1.19 RECORD DRAWINGS

- A. The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.
- B. The Owner will provide the Contractor with a suitable set of contract drawings on which daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.
- C. The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.
- D. At completion of the project, the Contractor shall submit the marked-up record drawings to the Owner and Architect prior to final payment.

## PART 2 - PRODUCTS

### 2.1 ACCESS PANELS AND DOORS

- A. Lay-in Ceilings:
  1. Removable lay-in ceiling tiles in 2 x 2 foot or 2 x 4 foot configuration provided under other divisions are sufficient; no additional access provisions are required unless specifically indicated.
- B. Concealed Spline Ceilings:
  1. Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used will be provided under other divisions.
- C. Metal Pan Ceilings:
  1. Removable sections of ceiling tile held in position by pressure fit will be provided under other divisions.
- D. Plaster Walls and Ceilings:
  1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

### 2.2 IDENTIFICATION

- A. See Electrical section 260553 – Identification for Electrical Systems.

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## 2.3 NON-RATED PENETRATIONS:

### A. Conduit Penetrations Through Below Grade Walls:

1. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.

### B. Conduit and Cable Tray Penetrations:

1. At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

## PART 3 - EXECUTION

### 3.1 EXCAVATION AND BACKFILL

- A. Perform all excavation and backfill work to accomplish indicated electrical systems installation. Blasting will not be allowed.

### 3.2 CONCRETE WORK

- A. Confirm with the Construction Manager or General Contractor that the Division 03 Contractor will perform all cast-in-place concrete unless noted otherwise elsewhere. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

### 3.3 CUTTING AND PATCHING

- A. Refer to Division 01, General Requirements, Cutting and Patching.

### 3.4 BUILDING ACCESS

- A. Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

### 3.5 EQUIPMENT ACCESS

- A. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish the access doors to the General Contractor and reimburse the General Contractor for installation of those access doors.

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## 3.6 COORDINATION

- A. The Contractor shall cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.
- B. The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed units installed in/on architectural surfaces.
- C. Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.
- D. Verify system completion to the testing consultant. Demonstrate the starting, interlocking and control features of each system so the testing contractor can perform its work.
- E. Comply with NECA 1.
- F. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- G. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- H. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- I. Right of Way: Give to piping systems installed at a required slope.

## 3.7 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATION

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Cut sleeves to length for mounting flush with both surfaces of walls.
- E. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- F. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry

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1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- I. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- J. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- K. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.
- L. Pipe sleeves for conduits 6" in diameter and smaller, in new poured concrete construction, shall be schedule 40 steel pipe, plastic removable sleeve or sheet metal sleeve, all cast in place.
- M. In wet area floor penetrations, top of sleeve to be 2 inches above the adjacent floor. In existing wet area floor penetrations, core drill sleeve openings large enough to insert schedule 40 sleeve and grout the area around the sleeve. If a pipe clamp resting on the sleeve supports the pipe penetrating the sleeve, weld a collar or struts to the sleeve that will transfer weight to the existing floor structure. Wet areas for this paragraph are rooms or spaces containing air handling unit coils, converters, pumps, chillers, boilers, and similar waterside equipment.
- N. Pipe penetrations in existing concrete floors that are not in wet areas may omit the use of schedule 40 sleeve and use the core drilled opening as the sleeve.

## 3.8 SEALING

- A. Non-Rated Surfaces:
  1. When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.
  2. Use galvanized sheet metal sleeves in hollow wall penetrations to provide a backing for the sealant. Grout area around sleeve in masonry construction.
  3. Install escutcheons or floor/ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces for this paragraph include only those rooms with finished ceilings and the penetration occurs below the ceiling.
  4. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance with the manufacturer's instructions. Install so that the bolts used to tighten the seal are accessible from the interior of the building or vault.
  5. At interior partitions, conduit penetrations are required to be sealed for all clean rooms, laboratories, and most hospital spaces, computer rooms, dormitory rooms, tele/data/com rooms and similar spaces where the room pressure or odor transmission must be controlled. Apply sealant to both sides of the penetration in such a manner that the annular space between the conduit sleeve and the conduit is completely filled.

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### 3.9 HOUSEKEEPING AND CLEAN UP

- A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

END OF SECTION 26 05 00



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SECTION 26 05 19  
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.
  - 3. Sleeves and sleeve seals for cables.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

### 1.3 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.
- C. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

### 2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Hubbell Power Systems, Inc.
  - 3. O-Z/Gedney; EGS Electrical Group LLC.
  - 4. 3M; Electrical Products Division.

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5. Tyco Electronics Corp.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## 2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07.

## 2.4 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Products & Systems, Inc.
  2. Calpico, Inc.
  3. Metraflex Co.
  4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  2. Pressure Plates: Stainless steel. Include two for each sealing element.
  3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway or Type XHHW, single conductors in raceway.

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- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- J. Class 2 Control Circuits: Type THHN-THWN, in raceway.

## 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

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- I. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

## 3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- D. Cut sleeves to length for mounting flush with both wall surfaces.
- E. Extend sleeves installed in floors 2 inches above finished floor level.
- F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable unless sleeve seal is to be installed.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07.
- J. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- K. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

## 3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

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### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19



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SECTION 26 05 23  
CONTROL-VOLTAGE ELECTRICAL POWER CABLES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. UTP cabling.
  - 2. RS-232 cabling.
  - 3. Low-voltage control cabling.
  - 4. Control-circuit conductors.
  - 5. Identification products.

### 1.2 DEFINITIONS

- A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- B. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.
- C. Maintenance data.

### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of an NRTL.
- B. 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: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.

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- B. Test each pair of UTP cable for open and short circuits.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
  - 2. Lacing bars, spools, J-hooks, and D-rings.
  - 3. Straps and other devices.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
  - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.

### 2.2 BACKBOARDS

- A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry."

### 2.3 UTP CABLE

- 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. Belden CDT Inc.; Electronics Division.
  - 2. Berk-Tek; a Nexans company.
  - 3. CommScope, Inc.
  - 4. Draka USA.
  - 5. Genesis Cable Products; Honeywell International, Inc.
  - 6. KRONE Incorporated.
  - 7. Mohawk; a division of Belden CDT.
  - 8. Nordex/CDT; a subsidiary of Cable Design Technologies.
  - 9. Superior Essex Inc.
  - 10. SYSTIMAX Solutions; a CommScope, Inc. brand.
  - 11. 3M.
  - 12. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: 100-ohm, four-pair UTP.
  - 1. Comply with ICEA S-90-661 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
  - 3. Comply with TIA/EIA-568-B.2, Category 6.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

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- a. Communications, General Purpose: Type CM or Type CMG.
- b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
- c. Communications, Riser Rated: Type CMR, complying with UL 1666.
- d. Communications, Limited Purpose: Type CMX.
- e. Multipurpose: Type MP or Type MPG.
- f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
- g. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

## 2.4 RS-232 CABLE

### A. Standard Cable: NFPA 70, Type CM.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Polypropylene insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. PVC jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
6. Flame Resistance: Comply with UL 1581.

### B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

## 2.5 LOW-VOLTAGE CONTROL CABLE

### A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

### B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

### C. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.

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4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

D. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

## 2.6 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

## 2.7 IDENTIFICATION PRODUCTS

- 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. Brady Corporation.
  2. HellermannTyton.
  3. Kroy LLC.
  4. Panduit Corp.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PATHWAYS

- A. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- B. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.
- D. Pathway Installation in Equipment Rooms:

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1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed or in the corner of room if multiple sheets of plywood are installed around perimeter walls of room.
  2. Install cable trays to route cables if conduits cannot be located in these positions.
  3. Secure conduits to backboard if entering room from overhead.
  4. Extend conduits 3 inches above finished floor.
  5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- E. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

## 3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
  2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
  4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
  6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
  8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
  2. Install 110-style IDC termination hardware unless otherwise indicated.
  3. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.

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3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

## F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

## 3.3 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables.

## 3.4 CONTROL-CIRCUIT CONDUCTORS

### A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12 AWG.

## 3.5 GROUNDING

- A. For data communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

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- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

## 3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

## 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Visually inspect UTP cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
  - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 26 05 23



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## SECTION 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

#### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

#### 2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

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- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet in diameter.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
  - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
  - 9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

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- B. Water Heater Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- C. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
  - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
  - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

## 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 and shall be at least 12 inches deep, with cover.
  - 1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:

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1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

## 3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
  1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

## 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
- B. Report measured ground resistances that exceed the following values:
  1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

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## SECTION 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

#### 1.3 SUBMITTALS

- A. Product Data: For steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze hangers. Include Product Data for components.
  - 2. Steel slotted channel systems. Include Product Data for components.
  - 3. Equipment supports.
- C. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

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## PART 2 - PRODUCTS

### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti Inc.
      - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 3) MKT Fastening, LLC.
      - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

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2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
    - 2) Empire Tool and Manufacturing Co., Inc.
    - 3) Hilti Inc.
    - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
    - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

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## 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
  - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

## 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

## 3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03.

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- C. Anchor equipment to concrete base.
  - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

## 3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29



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SECTION 26 05 33  
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

### 1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

### 1.3 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
  - 2. Fittings for EMT: Steel or die-cast, set-screw or compression type.

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## 2.2 NONMETALLIC CONDUIT AND TUBING

- A. ENT: NEMA TC 13.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

## 2.3 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Flanged-and-gasketed type.
- E. Finish: Manufacturer's standard enamel finish.

## 2.4 NONMETALLIC WIREWAYS

- 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. Hoffman.
  - 2. Lamson & Sessions; Carlon Electrical Products.
- B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## 2.5 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Thomas & Betts Corporation.
- b. Walker Systems, Inc.; Wiremold Company (The).
- c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Butler Manufacturing Company; Walker Division.
- b. Enduro Systems, Inc.; Composite Products Division.
- c. Hubbell Incorporated; Wiring Device-Kellems Division.
- d. Lamson & Sessions; Carlon Electrical Products.
- e. Panduit Corp.
- f. Walker Systems, Inc.; Wiremold Company (The).
- g. Wiremold Company (The); Electrical Sales Division.

## 2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

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## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit.
  2. Concealed Conduit, Aboveground: Rigid steel conduit.
  3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
  4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed, Not Subject to Severe Physical Damage: EMT.
  3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  6. Damp or Wet Locations: Rigid steel conduit or IMC.
  7. Raceways for Optical Fiber or Communications Cable: EMT.
  8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

### 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

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- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- K. Raceways for Optical Fiber and Communications Cable: Install as follows:
  - 1. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
  - 2. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where otherwise required by NFPA 70.
- M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.
  - 1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
    - d. Attics: 135 deg F temperature change.

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2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
  3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

## 3.3 INSTALLATION OF UNDERGROUND CONDUIT

### A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified .
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 30.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
  - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
6. Warning Tape: Bury warning tape approximately 12 inches above direct-buried conduits. Align tape along the width and along the centerline of conduit.

END OF SECTION 26 05 33

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SECTION 26 05 53  
IDENTIFICATION FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

### 1.2 SUBMITTALS

- #### A. Product Data: For each electrical identification product indicated.

### 1.3 QUALITY ASSURANCE

- #### A. Comply with ANSI A13.1.
- #### B. Comply with NFPA 70.
- #### C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- #### D. Comply with ANSI Z535.4 for safety signs and labels.
- #### E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

## PART 2 - PRODUCTS

### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- #### A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- #### B. Colors for Raceways Carrying Circuits at 600 V or Less:
1. Black letters on an orange field.
  2. Legend: Indicate voltage.

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- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Specify thicker tags in paragraph below where exposed to damage or to rough service.
- G. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
- H. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

## 2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

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2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
  - D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
  - E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
  - F. CONDUCTOR IDENTIFICATION MATERIALS
  - G. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
  - H. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
  - I. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
  - J. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
    1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
    2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- 2.4 FLOOR MARKING TAPE
1. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
- 2.5 UNDERGROUND-LINE WARNING TAPE
- A. Tape:
    1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
    2. Printing on tape shall be permanent and shall not be damaged by burial operations.
    3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
  - B. Color and Printing:
    1. Comply with ANSI Z535.1 through ANSI Z535.5.
    2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
    3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
  - C. Tag: Type I:

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1. Pigmented polyolefin, bright-colored, compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft..
4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft..
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

## 2.6 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

## 2.7 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

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- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

## 2.8 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

## 2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

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- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

## 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. Power.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
    - a. Color shall be factory applied.
    - b. Colors for 208/120-V Circuits:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
    - c. Colors for 480/277-V Circuits:
      - 1) Phase A: Brown.
      - 2) Phase B: Orange.
      - 3) Phase C: Yellow.
    - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

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2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.
1. Comply with 29 CFR 1910.145.
  2. Identify system voltage with black letters on an orange background.
  3. Apply to exterior of door, cover, or other access.
  4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.
- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
    - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
    - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

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END OF SECTION 26 05 53

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SECTION 26 09 23  
LIGHTING CONTROL DEVICES

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Indoor occupancy and switchbox-mounted occupancy sensors.

#### B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

### 1.2 ACTION SUBMITTALS

- #### A. Product Data: For each type of product.

### 1.3 INFORMATIONAL SUBMITTALS

- #### A. Field quality-control reports.

### 1.4 CLOSEOUT SUBMITTALS

- #### A. Operation and maintenance data

## PART 2 - PRODUCTS

### 2.1 TIME SWITCHES

- #### A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper Industries, Inc.
2. Leviton Mfg. Company Inc.

- #### B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST.

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3. Contact Rating: 20-A ballast load, 120-/240-V ac .
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

## 2.2 INDOOR OCCUPANCY SENSORS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. [Bryant Electric; a Hubbell company.](#)
2. [Cooper Industries, Inc.](#)
3. [Hubbell Building Automation, Inc.](#)
4. [Leviton Mfg. Company Inc.](#)
5. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
6. [Sensor Switch, Inc.](#)
7. [Watt Stopper.](#)

- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outlet box.
  - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

- C. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..

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2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
  3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.
- D. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
  2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch- high ceiling.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
  4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch- high ceiling.
  5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot- high ceiling in a corridor not wider than 14 feet.
- E. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
  2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

## 2.3 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. [Bryant Electric; a Hubbell company.](#)
  2. [Cooper Industries, Inc.](#)
  3. [Hubbell Building Automation, Inc.](#)
  4. [Leviton Mfg. Company Inc.](#)
  5. [Lithonia Lighting; Acuity Lighting Group, Inc.](#)
  6. [Sensor Switch, Inc.](#)
  7. [Watt Stopper.](#)
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with California Title 24.
  2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
  3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.

- C. Wall-Switch Sensor Tag WS1:

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1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft.
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP. SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Dual voltage, 120 and 277 V and passive-infrared dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

## D. Wall-Switch Sensor Tag WS2:

1. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft..
2. Sensing Technology: PIR.
3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Dual voltage, 120 and 277 V and passive-infrared dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

## 2.4 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- B. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

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1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
- C. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.
- D. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- E. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

## 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 26 09 23



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SECTION 26 24 16  
PANELBOARDS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
  - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
  - 3. Detail bus configuration, current, and voltage ratings.
  - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
  - 5. Include evidence of NRTL listing for series rating of installed devices.
  - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - 7. Include wiring diagrams for power, signal, and control wiring.
  - 8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
- C. Field quality-control reports.
- D. Panelboard schedules for installation in panelboards.
- E. Operation and maintenance data.

### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

### 1.4 WARRANTY

- 1. Warranty Period: Five years

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## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Flush- and surface-mounted cabinets.
  - 1. Rated for environmental conditions at installed location.
    - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    - b. Outdoor Locations: NEMA 250, Type 3R.
    - c. Kitchen Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
    - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
  - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
  - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
  - 4. Directory Card: Inside panelboard door, mounted in transparent card holder.
- B. Incoming Mains Location: Top and bottom.
- C. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
  - 1. Material: Hard-drawn copper, 98 percent conductivity.
  - 2. Main and Neutral Lugs: Compression type.
  - 3. Ground Lugs and Bus Configured Terminators: Compression type.
  - 4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
  - 5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

### 2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Siemens Energy & Automation, Inc.
  - 2. Square D; a brand of Schneider Electric.
  - 3. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.

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- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Mains: As indicated in drawing.
- E. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- G. Branch Overcurrent Protective Devices: Fused switches.

## 2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Siemens Energy & Automation, Inc.
  - 2. Square D; a brand of Schneider Electric.
  - 3. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
  - 1. External Control-Power Source: 120-V branch circuit.
- F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- G. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

## 2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. Siemens Energy & Automation, Inc.
  - 3. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

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1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
  6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
  7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
  8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
    - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - e. Communication Capability: Circuit-breaker-mounted Din-rail-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26.
    - f. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    - g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    - h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section "Fuses."

## 2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

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## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407.

above finished floor or grade.

- B. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Install overcurrent protective devices and controllers not already factory installed.
- E. Subparagraph below assumes that settings are indicated on Drawings or a coordination report is available for Contractor to use.
- F. Set field-adjustable, circuit-breaker trip ranges.
- G. Install filler plates in unused spaces.
- H. Retain first paragraph below if ceilings are accessible or there are raised floors, or when panelboards are located in spaces that will be finished.
- I. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- K. Comply with NECA 1.

### 3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

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## 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- C. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 24 16

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SECTION 26 27 26  
WIRING DEVICES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Communications outlets.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

### 1.3 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

(Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles)

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

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## 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 5351 (single), 5352 (duplex).
    - b. Hubbell; HBL5351 (single), CR5352 (duplex).
    - c. Leviton; 5891 (single), 5352 (duplex).
    - d. Pass & Seymour; 5381 (single), 5352 (duplex).

## 2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; GF20.
    - b. Pass & Seymour; 2084.

## 2.4 COMMUNICATIONS OUTLETS

- A. Telephone Outlet:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 3560-6.
    - b. Leviton; 40649.
  - 2. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1 complying with Category 5e. Comply with UL 1863.

## 2.5 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: 0.035-inch- thick, satin-finished stainless steel.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

## 2.6 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.

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1. Wiring Devices Connected to Normal Power System: Match existing in other areas of the dining building.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
  1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailling existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
  1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
  2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
  6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
  7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  8. Tighten unused terminal screws on the device.

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9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles to match other existing devices in the dining building.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

## 3.2 IDENTIFICATION

- A. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

## 3.3 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

END OF SECTION 26 27 26

# Downtown Bradenton Transit Station

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SECTION 26 28 13  
FUSES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.

### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA FU 1 for cartridge fuses.
- C. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Bussmann, Inc.
  - 2. Edison Fuse, Inc.
  - 3. Ferraz Shawmut, Inc.
  - 4. Littelfuse, Inc.

### 2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

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## PART 3 - EXECUTION

### 3.1 FUSE APPLICATIONS

- A. Service Entrance: Class L, time delay.
- B. Feeders: Class J, time delay.
- C. Motor Branch Circuits: Class RK5, time delay.
- D. Other Branch Circuits: Class J, fast acting.
- E. Control Circuits: Class CC, fast acting.

### 3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

### 3.3 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

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## SECTION 26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Shunt trip switches.
  - 4. Molded-case circuit breakers (MCCBs).
  - 5. Enclosures.

#### 1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.
- D. Operation and maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

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## PART 2 - PRODUCTS

### 2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. Siemens Energy & Automation, Inc.
  3. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  4. Lugs: Suitable for number, size, and conductor material.
  5. Service-Rated Switches: Labeled for use as service equipment.

### 2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. Siemens Energy & Automation, Inc.
  3. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

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- D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  - 3. Lugs: Suitable for number, size, and conductor material.

## 2.3 SHUNT TRIP SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Bussmann, Inc.
  - 2. Ferraz Shawmut, Inc.
  - 3. Littelfuse, Inc.
- B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.
- C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.
- E. Accessories:
  - 1. Oiltight key switch for key-to-test function.
  - 2. Oiltight ON pilot light.
  - 3. Isolated neutral lug.
  - 4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
  - 5. Form C alarm contacts that change state when switch is tripped.
  - 6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
  - 7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

## 2.4 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. Siemens Energy & Automation, Inc.
  - 3. Square D; a brand of Schneider Electric.

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- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
  - 1. Instantaneous trip.
  - 2. Long- and short-time pickup levels.
  - 3. Long- and short-time time adjustments.
  - 4. Ground-fault pickup level, time delay, and  $I^2t$  response.
- E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- F. Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
  - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
  - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
  - 5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
  - 6. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
  - 7. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

## 2.5 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 3R.
  - 3. Wash-Down Areas: NEMA 250,, stainless steel.
  - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
  - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

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- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

## 3.2 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

## 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
  - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- C. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16



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SECTION 26 43 13  
SURGE PROTECTIVE DEVICES (SPD)

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Surge protective devices on power circuits at facility entrances to protect the structure from lightning.
- B. Surge protective devices on signal, data, and control lines at facility entrances to protect the structure from lightning.

### 1.2 SUBMITTALS

- A. 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. 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 protection device to maintain the system's UL 1449 listing.
- B. Independent Testing:
  - 1. High exposure with the 10 x 1,000• s tests per IEEE C62.41.2 Section 7.2.
  - 2. Life Cycle/Repetitive Testing per C62.45-2002 section B.38 minimum of 2,000 times.
- C. National Electrical Code (NEC) 285 - Installation requirements for SPD.
  - 1. Article 285.2, SPD must limit transient voltage by diverting or limiting surge current; it also should prevent continued flow of follow current while remaining capable of repeating these functions. SPD that utilize fuses must have repetitive surge capability that can survive its surge rating and meet UL 1449.
  - 2. Article 285.6, TVSS shall be marked with a short circuit current rating and shall not be installed at a point on the system (ex. service, distribution or branch panels) where the available fault current (AIC rating) is in excess of that rating.
- D. UL 1449 stipulation for fused SPD - The manufacturer's authorized representative is required to submit the following:
  - 1. Certify that the SPD is UL 1449 3<sup>rd</sup> edition listed (UL Card) with UL Card.
  - 2. Indicate the type of internal or external fusing that is incorporated in the SPD and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.

### 1.3 STANDARDS

- A. Underwriters Laboratories 1449 - (UL 1449 3<sup>rd</sup> Edition)  
Include Electromagnetic interference filter which provides noise attenuation.

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- B. National Electrical Code 2008 rev. - (NEC Article 285 SPD installation practice/NEC article 250.56 grounding)  
NFPA-78 and CSA - (National Fire Protection Association and Canadian Standards Associations)  
ISO 9001:2000 - quality standard  
Military standards (mil-std 220B)
- C. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and c62.41.2 – 2002 rev. - (system shall be designed to meet c62.41)
  - 1. IEEE C62.41.2-2002 section 7.2 long duration 10 x 1,000 • sec test to be compliant if the device exhibits less than 10% deviation from initial readings. Units must be tested to withstand and pass the 10 x 1,000 • sec test
  - 2. IEEE C62.45 – 2002 rev. - (system shall be tested to meet the C62.45)
  - 3. Category A & B - (0.5 • s x 100 kHz ring wave)
  - 4. Category B3 bi-wave - (8 x 20 • s at 3,000 amperes and 1.2 x 50 • s at 6,000 volts)
  - 5. Category C3 bi-wave - (8 x 20 • s at 10,000 amperes and 1.2 x 50 • s at 20,000 volts)
- D. IEEE Std. 1100 (2005) “The Emerald Book” Section 8.4.2.5
- E. 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 per C62.45-2002 section b.38 referencing 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 an IEEE c62.33 (MOV test) and c62.35 (sad test) without failure or degradation exceeding ±10%.
- F. 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).
- G. UL 1449 3<sup>rd</sup> Edition Voltage Protection Rating (VPR) is assigned to each mode of protection using a combination wave generator at a setting of 6kV, 3kA. SPD shall have a Nominal Discharge Current rating ( $I_n$ ) of 10kA or 20kA.
- H. All manufacturers must comply with above listed standards and any additions current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

## 1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fails in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Ten years from date of Substantial Completion.

## 1.5 RECEIVING, STORING AND PROTECTING

- A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

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## PART 2 - PRODUCTS

### 2.1 SERVICE ENTRANCE SUPPRESSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Current Technology Inc.; TG200-L2.
2. LEA International; PV400.
3. Liebert Corporation; a division of Emerson Network Power; S1-040-C.

No other Manufacturers will be accepted.

B. Surge Protection Devices:

1. Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 400kA per phase (L-N plus L-G) and 200kA per mode (L-N, L-G, L-L and N-G). 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.
2. 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.
3. 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.
4. The system shall be modular with field replaceable modules. Modular units shall contain a minimum of one module per phase.
5. Equipment shall provide the following monitoring features: dry contacts, digital surge counter and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4 enclosure unless noted otherwise on contract drawings.

### 2.2 DISTRIBUTION PANELBOARD SUPPRESSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Current Technology – TG125-L2
2. LEA International Inc. – LS200P
3. Liebert – LM 125-C

No other Manufacturers will be accepted.

B. Device shall meet all specification requirements in section 2.1 except as follows:

Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 200kA per phase (L-N plus L-G) and 100kA per mode (L-N, L-G, L-L and N-G).

1. The system protection 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. The unit shall be modular type with one large module.
2. Equipment shall provide the following monitoring features: dry contacts, surge counter and

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audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4X enclosure.

## 2.3 BRANCH PANEL SUPPRESSORS

### A. Acceptable Manufacturers and Models:

1. Current Technology – CGP060
2. LEA International Inc. –SP100
3. Liebert – ACV-111-RKE

No other Manufacturers will be accepted.

### B. Device shall meet all specification requirements in section 2.1 except as follows:

1. Equipment shall be a multi-stage parallel protector. Provide voltage configuration as required per contract documents. The equipment's minimum surge current capacity shall be 100kA per phase (L-N plus L-G) and 50kA per mode (L-N, L-G, L-L and N-G).
2. The system protection 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. The unit shall be non-modular type.
3. Equipment shall provide the following monitoring features: dry contacts and audible alarm with alarm disable switch. Equipment shall utilize a NEMA 4X enclosure.

## 2.4 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 12.

B. Outdoor Enclosures: NEMA 250 Type 4X.

## 2.5 SURGE PROTECTIVE DEVICES FOR SIGNAL, DATA, AND CONTROL LINES

A. Provide surge protective devices suitable for the protection of signal, data, antenna, and control lines.

1. Select surge protective devices with consideration for aspects such as the frequency, bandwidth, voltage, and current of the signal, data, antenna, or other communications lines and to ensure that insertion losses introduced by the surge protective devices are within acceptable operational limits.
2. Coordinate selection of surge protective devices for signal, data, antenna, and control lines with owner of equipment that is served by the lines.

B. Provide surge protective devices for of signal, data, and control lines that provide both common mode and differential mode protection.

C. Provide surge protective devices for signal, data, control, and alarm lines.

1. Devices shall be listed in accordance with UL 497B Standard for Safety Protectors for Data Communications and Fire Alarm Circuits.
2. Provide devices with ratings and connectors as required by the application.
3. Manufacturer: Transtector Systems, EDCO, MCG Electronics

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- D. Provide coaxial surge protective devices for antenna and RF signal lines.
  - 1. Devices shall be listed in accordance with UL 497C Standard for Safety Protectors for Coaxial Communications Circuits.
  - 2. Provide devices with ratings and connectors as required by the application.
  - 3. Provide bulkhead plates and low-impedance paths to ground where antenna cables enter the structure.
  - 4. Manufacturers: TII Network Technologies, Inc, Cable Innovations, PolyPhaser.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify mounting area is ready for equipment. Allow adequate clearances for maintenance.
- B. Verify that circuit rough-in is at correct location.

### 3.2 INSTALLATION

- A. Install surge protective devices externally mounted to the service entrance, distribution and branch panelboards, as stand-alone units. Internal products will not be accepted.
- B. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. SPD shall be installed with the shortest lead length possible not to exceed five (5') feet for service entrance and distribution and one foot and half (1.5') for branch panelboards from the power conductor(s) it is protecting. Have the manufacturer's installation instructions available at the construction site.
- C. Install surge protective device in the service equipment to protect each ungrounded conductor on the line side of the service entrance disconnecting means.
- D. Install surge protective device to protect each ungrounded conductor of power circuits that exits the structure to serve external detached equipment or other detached structures. Where such power circuits are longer than 100 ft install surge protective devices to protect each ungrounded conductor at both ends of the circuit.
- E. Install UL 497B listed surge protective device for each for signal, data, control, and alarm line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such signal, data, control, and alarm circuits are longer than 100 ft install UL 497B listed surge protective device at both ends of the circuit.
- F. Install UL 497C listed coaxial surge protective device for each for antenna and RF signal line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such antenna and RF signal circuits are longer than 100 ft install UL 497C listed coaxial surge protective device at both ends of the circuit.
- G. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.
- H. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.

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1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.
  2. Use approved means to make connections from the surge protective device to conductors to be protected.
- I. Provide low-impedance grounding for surge protective devices.
1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.
  2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building "main grounding electrode ground bar", "main grounding electrode ground bar extensions", effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.
  3. Do not use a lightning protection system down conductor to ground a surge protective device.

## 3.3 Field Quality Control

- A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.
- D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

## 3.4 STARTUP SERVICE

- A. Do not energize or connect service entrance equipment and panelboards to their sources until SPD are installed and connected.
- B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION 26 43 13

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SECTION 26 51 00  
INTERIOR LIGHTING

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

#### B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

### 1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

### 1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work are limited to the product(s) indicated on Drawings.

### 2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
    - b. UV stabilized.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.

### 2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. General Requirements for Electronic Ballasts:
  - 1. Comply with UL 935 and with ANSI C82.11.
  - 2. Designed for type and quantity of lamps served.
  - 3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
  - 4. Sound Rating: Class A.
  - 5. Total Harmonic Distortion Rating: Less than 10 percent.
  - 6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
  - 7. Operating Frequency: 42 kHz or higher.
  - 8. Lamp Current Crest Factor: 1.7 or less.
  - 9. BF: 0.88 or higher.
  - 10. Power Factor: 0.98 or higher.
- B. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.

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- C. Ballasts for Low-Temperature Environments: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.

## 2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

- A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:
  - 1. Lamp end-of-life detection and shutdown circuit.
  - 2. Automatic lamp starting after lamp replacement.
  - 3. Sound Rating: Class A.
  - 4. Total Harmonic Distortion Rating: Less than 20 percent.
  - 5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
  - 6. Operating Frequency: 20 kHz or higher.
  - 7. Lamp Current Crest Factor: 1.7 or less.
  - 8. BF: 0.95 or higher unless otherwise indicated.
  - 9. Power Factor: 0.98 or higher.
  - 10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

## 2.5 EMERGENCY FLUORESCENT POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
  - 1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
  - 2. Nightlight Connection: Operate one fluorescent lamp continuously.
  - 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
    - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  - 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
  - 6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

## 2.6 BALLASTS FOR HID LAMPS

- A. Electronic Ballast for Metal-Halide Lamps: Include the following features unless otherwise indicated:
  - 1. Minimum Starting Temperature: Minus 20 deg F for single-lamp ballasts.

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2. Rated Ambient Operating Temperature: 130 deg F.
3. Lamp end-of-life detection and shutdown circuit.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 20 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Lamp Current Crest Factor: 1.5 or less.
8. Power Factor: 0.90 or higher.
9. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
10. Protection: Class P thermal cutout.

## 2.7 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
  2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
  3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
    - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

## 2.8 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
  1. Battery: Sealed, maintenance-free, lead-acid type.
  2. Charger: Fully automatic, solid-state type with sealed transfer relay.
  3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.

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7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.

## 2.9 FLUORESCENT LAMPS

- A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 4100 K, and average rated life 20,000 hours unless otherwise indicated.
- B. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 4100 K, and average rated life of 20,000 hours unless otherwise indicated.
- C. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start unless otherwise indicated.
  1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
  2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
  3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
  4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
  5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
  6. 57 W: T4, triple tube, rated 4300 initial lumens (minimum).
  7. 70 W: T4, triple tube, rated 5200 initial lumens (minimum).

## 2.10 HID LAMPS

- A. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and color temperature 4000 K.
- B. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
- C. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000 K.

## 2.11 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 10 gage.
- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 10 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

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- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Comply with NFPA 70 for minimum fixture supports.
- C. Suspended Lighting Fixture Support:
  - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
  - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### 3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 51 00

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SECTION 26 56 00  
EXTERIOR LIGHTING

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior luminaires with lamps and ballasts.
  - 2. Luminaire-mounted photoelectric relays.
  - 3. Poles and accessories.

### 1.2 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.
- B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.
- C. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.
  - 1. Basic wind speed for calculating wind load for poles 50 feet high or less is 130 mph.
    - a. Wind Importance Factor: 1.15.
    - b. Minimum Design Life: 25 years.
    - c. Velocity Conversion Factors: 1.0.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
- B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with IEEE C2, "National Electrical Safety Code."
- C. Comply with NFPA 70.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

### 2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
  - 1. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.
- B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

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- M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
  - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    - a. Color: As selected from manufacturer's standard catalog of colors.
  
- N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
  - 3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  - 4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
    - a. Color: Dark bronze.
  
- O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp and ballast characteristics:
    - a. "USES ONLY" and include specific lamp type.
    - b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
    - c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    - d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
    - e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    - f. CCT and CRI for all luminaires.

## 2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
  
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time

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delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.

1. Relay with locking-type receptacle shall comply with ANSI C136.10.
2. Adjustable window slide for adjusting on-off set points.

## 2.4 FLUORESCENT BALLASTS AND LAMPS

### A. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.
2. Temperatures Minus 20 Deg F and Higher: Electromagnetic type designed for use with indicated lamp types.

### B. Ballast Characteristics:

1. Power Factor: 90 percent, minimum.
2. Sound Rating: Class A.
3. Total Harmonic Distortion Rating: Less than 10 percent.
4. Electromagnetic Ballasts: Comply with ANSI C82.1, energy-saving, high power factor, Class P, automatic-reset thermal protection.
5. Case Temperature for Compact Lamp Ballasts: 65 deg C, maximum.
6. Transient-Voltage Protection: Comply with IEEE C62.41.1 and IEEE C62.41.2, Category A or better.

### C. Low-Temperature Lamp Capability: Rated for reliable starting and operation with ballast provided at temperatures minus 20 deg F and higher.

## 2.5 BALLASTS FOR HID LAMPS

### A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:

1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
2. Minimum Starting Temperature: Minus 22 deg F.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

### B. High-Pressure Sodium Ballasts: Electromagnetic type with solid-state igniter/starter and capable of open-circuit operation without reduction of average lamp life. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.

## 2.6 HID LAMPS

### A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), CCT color temperature 1900 K, and average rated life of 24,000 hours, minimum.

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1. Dual-Arc Tube Lamp: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.
- B. Low-Pressure Sodium Lamps: ANSI C78.43.
- C. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and CCT color temperature 4000 K.
- D. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and CCT color temperature 4000 K.
- E. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and CCT color temperature 4000 K.

## 2.7 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

- A. Structural Characteristics: Comply with AASHTO LTS-4-M.
  1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
  2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
- B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
  1. Materials: Shall not cause galvanic action at contact points.
  2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
  3. Anchor-Bolt Template: Plywood or steel.
- D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws. Provide on all, except wood poles.
- E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- F. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.

## 2.8 POLE ACCESSORIES

- A. Duplex Receptacle: 120 V, 20 A in a weatherproof assembly complying with Section 262726 "Wiring Devices" for ground-fault circuit-interrupter type.

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1. Recessed, 12 inches above finished grade.
  2. Nonmetallic polycarbonate plastic or reinforced fiberglass, weatherproof in use, cover, color to match pole, that when mounted results in NEMA 250, Type 3R enclosure.
  3. With cord opening.
  4. With lockable hasp and latch that complies with OSHA lockout and tag-out requirements.
- B. Minimum 1800-W transformer, protected by replaceable fuses, mounted behind access cover.
- C. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.
- D. Transformer Type Base: Same material and color as pole. Coordinate dimensions to suit pole's base flange and accept ballast(s).

## PART 3 - EXECUTION

### 3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.
1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

### 3.2 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
1. Fire Hydrants and Storm Drainage Piping: 60 inches.
  2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet.
  3. Trees: 15 feet from tree trunk.
- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."
- D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.

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2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
  3. Install base covers unless otherwise indicated.
  4. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- E. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
1. Dig holes large enough to permit use of tampers in the full depth of hole.
  2. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
- F. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
1. Make holes 6 inches in diameter larger than pole diameter.
  2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days, and finish in a dome above finished grade.
  3. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
  4. Cure concrete a minimum of 72 hours before performing work on pole.
- G. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6-inch- wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level 1 inch below top of concrete slab.
- H. Raise and set poles using web fabric slings (not chain or cable).

## 3.3 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

- A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

## 3.4 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

## 3.5 GROUNDING

- A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."
1. Install grounding electrode for each pole unless otherwise indicated.

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2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."
1. Install grounding electrode for each pole.
  2. Install grounding conductor and conductor protector.
  3. Ground metallic components of pole accessories and foundations.

END OF SECTION 26 56 00

**Division 31**  
Earthwork



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SECTION 31 66 13  
HELICAL PILES

## PART 1 - GENERAL

### 1.1 Scope of Work

This work consists of furnishing all necessary engineering and design services, supervision, labor, tools, materials, and equipment to perform all work necessary to install the Helical Piles as shown on the drawings. The Contractor shall install a Helical Pile that will develop the load capacities as detailed on the drawings. This may also include provisions for load testing to verify Helical Pile capacity and deflection, if part of the scope of work. The responsibilities and duties of the respective parties for this project are summarized in Table-1.

**Table-1.** Tasks and Responsibilities to be Allocated for Helical Pile Work

<u>TASK</u>		<b>RESPONSIBLE PARTY</b>
1	Geotechnical Investigation	Ardaman & Assoc.
2	Site Investigation and potential work restrictions	Contractor
3	Requirement for a pre-contract testing program, and procurement method	Owner
4	Obtaining easements	Owner
5	Overall design of the Helical Pile structure – including design loads (vertical, horizontal, etc.), pile locations, and pile spacing and orientation	ZNS Engineering
6	Definition and qualification of safety factors	ZNS Engineering
7	Calculation/estimation of allowable structural and/or Helical Pile movement in service (acceptance criteria)	Ardaman & Assoc.
8	Type and number of tests (pre-contract, pre-production and production)	ZNS Engineering
9	Minimum total Helical Pile length, depth to bearing stratum	Ardaman & Associates
10	Design and details of Helical Pile components	Contractor
11	Details of corrosion protection	ZNS Engineering
12	Details of pile connection to structure	ZNS Engineering
13	Preparation of Working Drawings and test reports	Contractor
14	Evaluation of test results	Ardaman & Assoc.
15	Construction methods, schedule, sequencing, and coordination of work	Contractor
16	Field production control, including logging of installation torque vs. installed depth	Ardaman & Assoc.
17	Supervision of work	Contractor

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## 1.2 References

Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation. In case of conflict, the particular requirements of this specification shall prevail. The latest publication as of the issue of this specification shall govern, unless indicated otherwise.

### **American Society for Testing and Materials (ASTM):**

- ASTM A29 - Steel Bars, Carbon and Alloy, Hot-Wrought and Cold Finished.
- ASTM A36 - Structural Steel.
- ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- ASTM A252 - Welded and Seamless Steel Pipe Piles.
- ASTM A775 - Electrostatic Epoxy Coating
- ASTM A193 - Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service.
- ASTM A320 - Alloy-Steel Bolting Materials for Low Temperature Service.
- ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- ASTM A513 - Standard Specification for Electric Resistance Welded Carbon and Alloy Steel Mechanical Tubing.
- ASTM A536 - Standard Specifications for Ductile Iron Castings
- ASTM A572 - HSLA Columbium-Vanadium Steels of Structural Quality.
- ASTM A618 - Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
- ASTM A656 - Hot-Rolled Structural Steel, High-Strength Low-Alloy Plate with Improved Formability.
- ASTM A958 - Standard Specification for Steel Castings, Carbon, and Alloy, with Tensile Requirements, Chemical Requirements Similar to Wrought Grades.
- ASTM A1018 - Steel, Sheet and Strip, Heavy Thickness Coils, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, Columbium or Vanadium, and High-Strength Low-Alloy with Improved Formability.
- ASTM D1143 - Method of Testing Piles Under Static Axial Compressive Load.
- ASTM D3689 - Method of Testing Individual Piles Under Static Axial Tensile Load.

### **American Welding Society (AWS):**

- AWS D1.1 - Structural Welding Code – Steel.
- AWS D1.2 - Structural Welding Code – Reinforcing Steel.

### **American Society of Civil Engineers (ASCE):**

- ASCE 20-96 - Standard Guidelines for the Design and Installation of Pile Foundations.

### **Deep Foundations Institute (DFI):**

- *Guide to Drafting a Specification for High Capacity Drilled and Grouted Micropiles for Structural Support*, 1<sup>st</sup> Edition, Copyright 2001 by the Deep Foundation Institute (DFI).

### **Society of Automotive Engineers (SAE):**

- SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners.

## 1.3 Related Project Specifications

03 10 00 Concrete Forming & Accessories  
03 20 00 Concrete Reinforcing  
03 30 00 Cast-in-Place Concrete

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## 1.4 Submittals

- 1.4.1 The Contractor or Engineer shall prepare and submit to the Owner, for review and approval, working drawings and design calculations for the Helical Piles intended for use at least 14 calendar days prior to planned start of construction (but note also Paragraph 3.1.8). All submittals shall be signed and sealed by a Registered Professional Engineer currently licensed in the State of Florida.
- 1.4.2 The Contractor shall submit a detailed description of the construction procedures proposed for use to the Owner for review. This shall include a list of major equipment to be used.
- 1.4.3 The Working Drawings shall include the following:
  - 1.4.3.1 Helical Pile number, location and pattern by assigned identification number
  - 1.4.3.2 Helical Pile design load
  - 1.4.3.3 Type and size of central steel shaft
  - 1.4.3.4 Helix configuration (number and diameter of helix plates)
  - 1.4.3.5 Minimum effective installation torque
  - 1.4.3.6 Minimum overall length
  - 1.4.3.7 Inclination of Helical Pile
  - 1.4.3.8 Cut-off elevation
  - 1.4.3.9 Helical Pile attachment to structure relative to grade beam, column pad, pile cap, etc.
- 1.4.4 The Contractor shall submit shop drawings for all Helical Pile components, including corrosion protection and pile top attachment to the Owner for review and approval. This includes Helical Pile lead/starter and extension section identification (manufacturer's catalog numbers).
- 1.4.5 If required, the Contractor shall submit certified mill test reports for the central steel shaft, as the material is delivered, to the Owner for record purposes. The ultimate strength, yield strength, % elongation, and chemistry composition shall be provided.
- 1.4.6 The Contractor shall submit plans for production testing for the Helical Piles to the Owner for review and acceptance prior to beginning load tests. The purpose of the test is to determine the load versus displacement response of the Helical Pile and provide an estimation of ultimate capacity.
- 1.4.7 The Contractor shall submit to the Owner copies of calibration reports for each torque indicator or torque motor, and all load test equipment to be used on the project. The calibration tests shall have been performed within forty five (45) working days of the date submitted. Helical Pile installation and testing shall not proceed until the Owner has received the calibration reports. These calibration reports shall include, but are not limited to, the following information:
  - 1.4.7.1 Name of project and Contractor
  - 1.4.7.2 Name of testing agency
  - 1.4.7.3 Identification (serial number) of device calibrated
  - 1.4.7.4 Description of calibrated testing equipment
  - 1.4.7.5 Date of calibration
  - 1.4.7.6 Calibration data
- 1.4.8 Work shall not begin until all the submittals have been received and approved by the Owner. The Contractor shall allow the Owner a reasonable time to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

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## 1.5 Definitions

**Contractor:** The person/firm responsible for performing the Helical Pile work.

**Coupling:** Central steel shaft connection means formed as integral part of the plain extension shaft material. For Type SS & RS Helical Piles, couplings are internal or external sleeves, or hot upset forged sockets.

**Coupling Bolt(s):** High strength, structural steel fasteners used to connect Helical Pile segments together. For Type SS segments, the coupling bolt transfers axial load. For Type RS segments, the coupling bolts transfer both axial and torsional forces.

**Helical Extension:** Helical Pile foundation component installed immediately following the lead or starter section, if required. This component consists of one or more helical plates welded to a central steel shaft of finite length. Function is to increase bearing area.

**Helix Plate:** Generally round steel plate formed into a ramped spiral. The helical shape provides the means to install the helical pile, plus the plate transfers load to soil in end bearing. Helix plates are available in various diameters and thickness.

**Helical Pile:** A bearing type foundation element consisting of a lead or starter section, helical extension (if so required by site conditions), plain extension section(s), and a pile cap. A.k.a. helical screw pile, screw pile, helical screw foundation.

**Installation Torque(T):** The resistance generated by a Helical Pile when installed into soil. The installation resistance is a function of the soil type, and size and shape of the various components of the Helical Pile.

**Lead Section:** The first Helical Pile foundation component installed into the soil, consisting of single or multiple helix plates welded to a central steel shaft. A.k.a. Starter Section.

**Pile Cap:** Connection means by which structural loads are transferred to the Helical Pile. The type of connection varies depending upon the requirements of the project and type of Helical Pile material used.

**Round Shaft (RS):** Round steel pipe central Shaft elements ranging in diameter from 2-7/8" to 10". A.k.a. Hollow Shaft (Type HS), Type T/C, Type PIF.

**Plain Extension:** Central steel shaft segment without helix plates. It is installed following the installation of the lead section or helical extension (if used). The segments are connected with integral couplings and bolts. Plain extensions are used to extend the helix plates beyond the specified minimum depth and into competent load bearing stratum.

**Safety Factor:** The ratio of the ultimate capacity to the working or design load used for the design of any structural element.

**Square Shaft (SS):** Solid steel, round-cornered-Square central Shaft elements ranging in size from 1-1/4" to 2-1/4". A.k.a. Type SQ.

**Torque Strength Rating:** The maximum torque energy that can be applied to the helical pile foundation during installation in soil, a.k.a. allowable, or safe torque.

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## 1.9. Ground Conditions

The Geotechnical Report, including logs of soil borings as shown on the boring location plan, shall be considered to be representative of the in-situ subsurface conditions likely to be encountered on the project site. Said Geotechnical Report shall be used as the basis for Helical Pile design using generally accepted engineering judgement and methods.

The Geotechnical Report shall be provided for purposes of bidding. If during Helical Pile installation, subsurface conditions of a type and location are encountered of a frequency that were not reported, inferred and/or expected at the time of preparation of the bid, the additional costs required to overcome such conditions shall be considered as extras to be paid for.

## PART 2- PRODUCTS

2.1 Helical Pile components as specified therein shall be manufactured by a facility whose quality systems comply with ISO (International Organization of Standards) 9001 requirements. Certificates of Registration denoting ISO Standards Number shall be presented upon request to the Owner or their representative.

2.2 Central Steel Shaft: The central steel shaft, consisting of lead sections, helical extensions, and plain extensions, shall be Type RS.

2.2.1 *Type RS2875 2-7/8" OD Material:* Structural steel tube or pipe, welded or seamless, in compliance with ASTM A500 or A513. Wall thickness = 0.262".

- a. Torque strength rating: 7,500 ft-lb.
- b. Minimum yield strength = 50 ksi

2.3 Helix Bearing Plate: Shall be hot rolled carbon steel sheet, strip, or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications.

2.3.1 *RS2875 Material:* Per ASTM A36 or A572 with minimum yield strength of 36 ksi. Minimum plate size shall be 6" square x 3/4" thick.

2.4 Bolts: Bolts used to connect the central steel shaft sections together shall be a minimum of (2) 3/4" diameter bolts per coupling, SAE J429 Grade 5 or 8.

2.5 Couplings: For Type RS2875, RS3500, and RS4500 material, the couplings shall either be formed as an integral part of the plain and helical extension material as hot forge expanded sockets, or as internal sleeve wrought steel connectors. The steel connectors can be either tubing or solid steel bar with holes for connecting shaft sections together.

2.6 Plates, Shapes, or Pile Caps: Depending on the application, the pile cap shall be a welded assembly consisting of structural steel plates and shapes designed to fit the pile and transfer the applied load. Structural steel plates and shapes for HELICAL PILE top attachments shall conform to ASTM A36 or ASTM A572 Grade 50.

2.7 Corrosion Protection: All pile material shall be hot-dipped galvanized in accordance with ASTM A153 or A123 after fabrication.

## 2.8 Design Criteria

2.8.1 Helical Piles shall be designed to meet the specified loads and acceptance criteria as shown on the drawings. The calculations and drawings required from the Contractor or

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Engineer shall be submitted to the Owner for review and acceptance in accordance to Section 1.4 "Submittals".

- 2.8.2 Helical Pile capacity in soil shall not be relied upon from the upper nine (9) foot depth of soil. The overall length and installed torque of a Helical Pile shall be specified such that the required in-soil capacity is developed by end-bearing on the helix plate(s) in an appropriate strata(s). It is recommended that the theoretical end-bearing capacity of the helix plates be determined using HeliCAP<sup>®</sup> Engineering Software or equal commercially available software. The required soil parameters ( $c$ ,  $\phi$ ,  $\gamma$ , or N-values) for use with HeliCAP<sup>®</sup> or equal shall be provided in the geotechnical reports. The Owner shall determine the allowable response to axial loads.
- 2.8.3 Lateral Load and Bending: Where Helical Piles are subjected to lateral or base shear loads as indicated on the plans, the bending moment from said loads shall be determined using lateral load analysis program such as LPILE or equal commercially available software. The required soil parameters ( $c$ ,  $\phi$ ,  $\gamma$ , and  $k_s$ ) for use with LPILE or equal shall be provided in the geotechnical reports. The Owner shall determine the allowable response to lateral loads. The combined bending and axial load factor of safety of the Helical Pile shall be as determined by the Owner.
- 2.8.4 Critical Buckling Load: Where Helical Piles are installed into low strength soil, the critical buckling load shall be determined using lateral load analysis program such as LPILE or equal commercially available software, or various other methods. The required soil parameters ( $c$ ,  $\phi$ ,  $\gamma$ , and  $k_s$ ) for use with LPILE or equal shall be provided in the geotechnical reports.
- 2.8.5 The Helical Pile attachment (pile cap) shall distribute the design load (DL) to the concrete foundation such that the concrete bearing stress does not exceed those in the ACI Building Code and the stresses in the steel plates/welds does not exceed AISC allowable stresses for steel members.

## PART 3- EXECUTION

### 3.1 Quality Assurance

- 3.1.1 The Helical Pile Contractor shall be experienced in performing design and construction of Helical Piles and shall furnish all materials, labor, and supervision to perform the work. The Contractor shall be trained and certified by the pile manufacturer in the proper methods of design and installation of Helical Piles. The Helical Pile Contractor shall not sublet the whole or any part of the contract without the express written permission of the Owner.
- 3.1.2 The Contractor shall employ an adequate number of skilled workers who are experienced in the necessary crafts and who are familiar with the specified requirements and methods needed for proper performance of the work of this specification. The Contractor shall provide names of on-site personnel materially involved with the work, including those who carry documented certification from the pile manufacturer. At a minimum, these personnel shall include foreman, machine operator, and project engineer/manager. Certification documents shall be provided upon request to the Owner or their representative.
- 3.1.3 All Helical Piles shall be installed in the presence of a designated representative of the Owner unless said representative informs the Contractor otherwise. The designated representative shall have the right of access to any and all field installation records and test reports.

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## 3.2 Site Conditions

- 3.2.1 Prior to commencing Helical Pile installation, the Contractor shall inspect the work of all other trades and verify that all said work is completed to the point where Helical Piles may commence without restriction.
- 3.2.2 The Contractor shall verify that all Helical Piles may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, etc.
- 3.2.3 In the event of a discrepancy, the Contractor shall notify the Owner. The Contractor shall not proceed with Helical Pile installation in areas of discrepancies until said discrepancies have been resolved. All costs associated with unresolved discrepancies shall be the responsibility of the Owner.

## 3.3 Installation Equipment

- 3.3.1 Shall be rotary type, hydraulic power driven torque motor with clockwise and counter-clockwise rotation capabilities. The torque motor shall be capable of continuous adjustment to revolutions per minute (RPM's) during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed.
- 3.3.2 Equipment shall be capable of applying adequate down pressure (crowd) and torque simultaneously to suit project soil conditions and load requirements. The equipment shall be capable of continuous position adjustment to maintain proper Helical Pile alignment.
- 3.3.3 A torque indicator shall be used during Helical Pile installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling. Torque indicators are available from CHANCE Civil Construction.
  - a. Shall be capable of providing continuous measurement of applied torque throughout the installation.
  - b. Shall be capable of torque measurements in increments of at least 500 ft-lb
  - c. Shall be calibrated prior to pre-production testing or start of work. Torque indicators which are an integral part of the installation equipment, shall be calibrated on-site. Torque indicators which are mounted in-line with the installation tooling, shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be calibrated at normal operating temperatures.
  - d. Shall be re-calibrated, if in the opinion of the Owner and/or Contractor reasonable doubt exists as to the accuracy of the torque measurements.

## 3.4 Installation Procedures

- 3.4.1 *Central Steel Shaft: (Lead and Extension Sections)*
  - a. The Helical Pile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.
  - b. The lead section shall be positioned at the location as shown on the working drawings. Battered Helical Piles can be positioned perpendicular to the ground to assist in initial advancement into the soil before the required batter angle shall be established. The Helical Pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of 5 to 20 RPM's. Extension sections shall be provided to

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obtain the required minimum overall length and installation torque as shown on the working drawings. Connect sections together using coupling bolt(s) and nut torqued to 40 ft-lb.

- c. Sufficient down pressure shall be applied to uniformly advance the Helical Pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

## 3.5 Termination Criteria

- 3.5.1 The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.
- 3.5.2 The minimum installation torque and minimum overall length criteria as shown on the working drawings shall be satisfied prior to terminating the Helical Pile installation.
- 3.5.3 If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length required, the Contractor shall have the following options:
  - a. Terminate the installation at the depth obtained subject to the review and acceptance of the Owner, or:
  - b. Remove the existing Helical Pile and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new Helical Pile shall be terminated at least (3) three feet beyond the terminating depth of the original Helical Pile.
- 3.5.4 If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:
  - a. Install the Helical Pile deeper using additional extension sections, or:
  - b. Remove the existing Helical Pile and install a new one with additional and/or larger diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner. If re-installing in the same location, the top-most helix of the new Helical Pile shall be terminated at least (3) three feet beyond the terminating depth of the original Helical Pile.
  - c. De-rate the load capacity of the Helical Pile and install additional Helical Pile(s). The de-rated capacity and additional Helical Pile location shall be subject to the review and acceptance of the Owner.
- 3.5.5 If the Helical Pile is refused or deflected by a subsurface obstruction, the installation shall be terminated and the pile removed. The obstruction shall be removed, if feasible, and the Helical Pile re-installed. If the obstruction can't be removed, the Helical Pile shall be installed at an adjacent location, subject to review and acceptance of the Owner.
- 3.5.6 If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension. If it is not feasible to remove the last plain extension, the Contractor may cut said extension shaft to the correct elevation. The Contractor shall not reverse (back-out) the Helical Pile to facilitate extension removal.

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- 3.5.7 The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

### 3.6 Allowable Tolerances:

The tolerances quoted in this section are suggested maximums. The actual values established for a particular project will depend on the structural application.

- 3.6.1 Centerline of Helical Piles shall not be more than 3 inches from indicated plan location.
- 3.6.2 Helical Pile plumbness shall be within 2° of design alignment.
- 3.6.3 Top elevation of Helical Pile shall be within +1 inch to -2 inches of the design vertical elevation.

### 3.7 Installation Records:

The Contractor shall provide the Owner copies of Helical Pile installation records within 24 hours after each installation is completed. Records shall be prepared in accordance with the specified division of responsibilities as noted in Table-1. Formal copies shall be submitted on a weekly basis. These installation records shall include, but are not limited to, the following information.

- 3.7.1 Name of project and Contractor
- 3.7.2 Name of Contractor's supervisor during installation
- 3.7.3 Date and time of installation
- 3.7.4 Name and model of installation equipment
- 3.7.5 Type of torque indicator used
- 3.7.6 Location of Helical Pile by assigned identification number
- 3.7.7 Actual Helical Pile type and configuration – including lead section (number and size of helix plates), number and type of extension sections (manufacturer's SKU numbers)
- 3.7.8 Helical Pile installation duration and observations
- 3.7.9 Total length of installed Helical Pile
- 3.7.10 Cut-off elevation
- 3.7.11 Inclination of Helical Pile
- 3.7.12 Installation torque at one-foot intervals for the final 10 feet
- 3.7.13 Comments pertaining to interruptions, obstructions, or other relevant information
- 3.7.14 Rated load capacities

### 3.8 Test Reports:

The Contractor shall provide the Owner copies of field test reports within 24 hours after completion of the load tests. Records shall be prepared in accordance with the specified division of responsibilities as noted in Table-1. Formal copies shall be submitted within a reasonable amount of time following test completion. These test reports shall include, but are not limited to, the following information:

- 3.8.1 Name of project and Contractor
- 3.8.2 Name of Contractor's supervisor during installation
- 3.8.3 Name of third party test agency, if required
- 3.8.4 Date, time, and duration of test
- 3.8.5 Location of Helical Pile by assigned identification number
- 3.8.6 Type of test (i.e. tension or compression)
- 3.8.7 Description of calibrated testing equipment and test set-up
- 3.8.8 Actual Helical Pile type and configuration – including lead section, number and type of extension sections (manufacturer's SKU numbers)
- 3.8.9 Steps and duration of each load increment

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- 3.8.10 Cumulative pile-head movement at each load step
- 3.8.11 Comments pertaining to test procedure, equipment adjustments, or other relevant information
- 3.8.12 Signed by third party test agency rep., registered professional engineer, or as required by local jurisdiction

## 3.9 Testing Program

- 3.9.1 The hydraulic jack shall be positioned at the beginning of the test such that the unloading and repositioning of the jack during the test shall not be required. The jack shall also be positioned co-axial with respect to the pile-head so as to minimize eccentric loading. The hydraulic jack shall be capable of applying a load not less than two times the proposed design load (DL). The pressure gauge shall be graduated in 100 psi increments or less. The stroke of the jack shall not be less than the theoretical elastic shortening of the total Helical Pile length at the maximum test load.
- 3.9.2 An alignment load (AL) shall be applied to the Helical Pile prior to setting the deflection measuring equipment to zero or a reference position. The AL shall be no more than 10% of the design load (i.e., 0.1 DL). After AL is applied, the test set-up shall be inspected carefully to ensure it is safe to proceed.
- 3.9.3 Axial compression or tension load tests shall be conducted by loading the Helical Pile in step-wise fashion as shown in Table-3 to the extent practical. Pile-head deflection shall be recorded at the beginning of each step and after the end of the hold time. The beginning of the hold time shall be defined as the moment when the load equipment achieves the required load step.
- 3.9.4 Test loads shall be applied until continuous jacking is required to maintain the load step or until the test load increment equals 200% of the design load (DL) (i.e., 2.0 DL), whichever occurs first. The observation period for this last load increment shall be 10 minutes. Displacement readings shall be recorded at 1, 2, 3, 4, 5 and 10 minutes (load increment maxima only).
- 3.9.5 The applied test load shall be removed in four approximately equal decrements per the schedule in Table-2. The hold time for these load decrements shall be 1 minute, except for the last decrement, which shall be held for 5 minutes.

**Table-2.** Steps for Pre-Production Load Testing

LOAD STEP	HOLD TIME (MINUTES)
AL	1.0 Min.
0.20 DL	2.5 Min.
0.40 DL	2.5 Min.
0.60 DL	2.5 Min.
0.80 DL	2.5 Min.
1.0DL	2.5 Min.
0.75 DL	1.0 Min.
0.50 DL	1.0 Min.
0.25 DL	1.0 Min.
AL	1.0 Min.
0.5 DL	1.0 Min.
1.0 DL	1.0 Min.
1.2 DL	2.5 Min.
1.4 DL	2.5 Min.

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1.6 DL	2.5 Min.
1.8 DL	2.5 Min.
2.0 DL	10.0 Min.
1.5 DL	1.0 Min.
1.0 DL	1.0 Min.
0.5 DL	1.0 Min.
AL	5.0 Min.

AL = Alignment Load; DL = Design Load

### 3.10 Acceptance Criteria for HELICAL PILE Verification Load Tests

Both of the following criteria must be met for approval:

1. The Helical Pile shall sustain the compression and tension design capacities (1.0 DL) with no more than 1/2 in. (mm) total vertical movement of the pile-head as measured relative to the top of the Helical Pile prior to the start of testing.
2. Failure does not occur at the 2.0 DL maximum compression and tension test loads. The failure load shall be defined by one of the following definitions – whichever results in the lesser load:
  - The point at which the movement of the Helical Pile tip exceeds the elastic compression/tension of the pile shaft by 0.08 B, where B is defined as the diameter of the largest helix.
  - The point at which the slope of the load versus deflection (at end of increment) curve exceeds 0.05 inches/kip.

The Contractor shall provide the Owner copies of field test reports confirming Helical Pile configuration and construction details within 24 hours after completion of the pre-production load tests. Formal copies shall be submitted as per Section 1.4. This written documentation will either confirm the load capacity as required on the working drawings or propose changes based upon the results of the pre-production tests.

When a Helical Pile fails to meet the acceptance criteria, modifications shall be made to the design, the construction procedures, or both. These modifications include, but are not limited to, de-rating the Helical Pile load capacity, modifying the installation methods and equipment, increasing the minimum effective installation torque, changing the helix configuration, or changing the Helical Pile material (i.e., central steel shaft). Modifications that require changes to the structure shall have prior review and acceptance of the Owner. The cause for any modifications of design or construction procedures shall be decided in order to determine any additional cost implications.

3.11 Production Pile Testing: The Contractor shall perform proof tests on a minimum of one (1) production pile. The Helical Piles to be tested will be selected by the Owner.

The test sequence shall be as shown in the following Table:

LOAD STEP	HOLD TIME (MINUTES)
AL	0 Min.
0.20 DL	2.5 Min.
0.40 DL	2.5 Min.
0.60 DL	2.5 Min.
0.80 DL	2.5 Min.
1.00 DL	5 Min.
0.60 DL	1 Min.
0.40 DL	1 Min.
0.20 DL	1 Min.
AL	5 Min.

AL = Alignment Load; DL = Design Load

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The acceptance criteria for production Helical Piles shall be per Section 3.11.

If a production Helical Pile that is tested fails to meet the acceptance criteria, the Contractor shall be directed to proof test another Helical Pile in the vicinity. For failed Helical Piles and further construction of other foundations, the Contractor shall modify the design, the construction procedure, or both. These modifications include, but are not limited to, installing replacement Helical Piles, modifying the installation methods and equipment, increasing the minimum effective installation torque, changing the helix configuration, or changing the Helical Pile material (i.e., central steel shaft). Modifications that require changes to the structure shall have prior review and acceptance of the Owner. Any modifications of design or construction procedures shall be at the Contractor's expense.

END OF SECTION