

City of Dyersburg

Forked Deer River Park Restroom Facility



**CITY OF DYERSBURG
CITY HALL
425 WEST COURT ST
DYERSBURG, TN 38024**

TABLE OF CONTENTS

Advertisement for Bids.....	AFB-1
Instructions for Bidders.....	IFB-1-5
Bid Bond.....	BB-1
Non-Collusion Affidavit	NCA-1
Unit Price Bid Form.....	UPBF-1-5
Construction Contract.....	CC-1-9
Performance Bond	PB-1-2
Payment Bond.....	PYB-1-2
Notice of Award.....	NA-1
Notice to Proceed.....	NP-1
Contractor Certification.....	1-3
FHWA Form.....	1-12
Buy America Certification.....	1
General Conditions	EJCDC 1-70
Technical Specifications.....	

ADVERTISEMENT FOR BIDS

Date: May 4, 2024

Separate sealed BIDS for the **CITY OF DYERSBURG Forked Deer River Park Bathroom Facility** will be received by the City of Dyersburg, Tennessee, at the Public Works Building, 435 Highway 51 Bypass South, Dyersburg, TN 38025-1358 until 10:00 A.M. Local Time, on Tuesday, May 28, 2024 and then at said place publicly opened and read aloud.

The work to be done consists of: Construction of a new bathroom facility at the Forked Deer River Park.

Electronic Copies of the Bidding Documents may be obtained at the office(s) of Public Works Building, 435 Highway 51 Bypass South, Dyersburg, TN 38024 after 12:00 P.M. on Monday, May 6, 2024 for no fee. However, any perspective bidder must be on the plan holders list with the City of Dyersburg.

The Owner reserves the right to waive any informality and to reject any or all bids.

In Order to qualify, a Prime Contractor must currently hold a current contractor's license in the State of Tennessee.

No bid will be opened unless the outside of the sealed envelope containing the bid provides the following information: The Contractor's license number, the date of the license's expiration, and a quotation of that part of his license classification applying to the bid. In the case of joint ventures, this information must be provided by each party submitting the bid.

All Bids must be made out on the Bid Form bound in with the bid manual. This Bid Form must not be detached from the bid manual. With his bid, each Bidder must deposit security in the amount of five percent (5%) of the amount of the bid, subject to the conditions stated in the Instruction to Bidders.

A Performance Bond and Labor and Material Payment Bond each in the amount of one hundred percent (100%) of the Contract Sum will be required of the successful Bidder.

No Bidder may withdraw his bid within sixty (60) days after the actual date of the opening thereof.

Tiffany Heard, P.E. City Engineer City of Dyersburg

INSTRUCTIONS FOR BIDDERS

1. DEFINED TERMS

Terms used in these Instructions for Bidders are defined in the EJCDE C-700 Standard General Conditions of the Construction Contract. The term "Successful Bidder" means the lowest, qualified, responsible Bidder to whom the Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. COPIES OF BIDDING DOCUMENTS

21. Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation may be obtained from Engineer (unless another issuing office is designated in the Advertisement or Invitation to Bid).
22. Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of the incomplete sets of Bidding Documents.
23. Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS

To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days of Owner's request written evidence, such as financial data, previous experience, and evidence of authority to conduct business in the jurisdiction where the Project is located. Each Bid must contain evidence of the Bidder's qualification to do business in the state where the Project is located or a covenant to obtain such qualification prior to award of the contract.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 4.1. Before submitting a Bid, each Bidder must: (a) examine the Contract Documents thoroughly; (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress, or performance of the Work; (c) familiarize himself with federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents.
- 4.2. On request, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid.
- 4.3. The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by the Contractor in performing the Work are identified in the Supplementary Conditions, General Requirements, or Drawings.

5 INTERPRETATIONS

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

6 BID SECURITY

- 6.1. Bid Security shall be made payable to Owner, in an amount of five (5) percent of the Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached, if a form is prescribed) issued by a Surety meeting the requirements of the General Conditions.

- 6.2. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract Security, whereupon it will be returned; if the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the "effective date of the Agreement" (which term is defined in the General Conditions) by Owner to Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.

7 CONTRACT TIME

The number of days within which, or the date by which, the Work is to be completed (the Contract Time) is set forth in the Bid Form and will be included in the Agreement.

8 LIQUIDATED DAMAGES

Provisions for liquidated damages, if any, are set forth in the Agreement.

9 SUBSTITUTE MATERIAL AND EQUIPMENT

The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. When it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the "effective date of the Agreement." The procedure for submittal of any such application by Contractor and consideration by Engineer is set forth in the General Conditions which may be supplemented in the Supplementary Conditions.

10.**SUBCONTRACTORS, ETC.**

- 10.1. If the Supplementary Conditions require the identity of certain Subcontractors and other persons or organizations to be submitted to Owner in advance of the Notice of Award, the apparent Successful Bidder, and any other Bidder so requested, will within seven days after the day of the Bid opening submit to Owner a list of all Subcontractors and other persons or organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the Work as to which such identification is so required. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each such Subcontractor, person, and organization if requested by the Owner. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, other person or organization, either may before giving the Notice of Award request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. If the apparent Successful Bidder declines to make any such substitution, the contract shall not be awarded to such Bidder, but his declining to make any such substitution will not constitute grounds for sacrificing his Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.
- 10.2. No contractor shall be required to employ any Subcontractor, other person or organization against whom he has reasonable objection.

11.**BID FORM**

- 11.1. The Bid Form is attached hereto; additional copies may be obtained from the Engineer.
- 11.2. Bid Forms must be completed in ink or by typewriter.
- 11.3. Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 11.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- 11.5. All names must be typed or printed below the signature.
- 11.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).
- 11.7. The address to which communications regarding the Bid are to be directed must be shown.

12 SUBMISSION OF BIDS

- 12.1 Bids shall be submitted at the time and place indicated in the Invitation to Bid and shall be included in an opaque sealed envelope, marked:

Project title.
Bidder's name and address.
Bidder's Tennessee Contractors License Number.
Bidder's License Expiration Date.
Bidder's License Classification.
Contract for which Bid is submitted.

- 12.2 Bids must be accompanied by Bid Security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof.

13 MODIFICATION AND WITHDRAWAL OF BIDS

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

- 13.2 If, within twenty-four hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to a reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw his Bid and the Bid Security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work.

14 OPENING OF BIDS

Bids will be opened publicly and will be read aloud. An abstract of the amounts of the base Bids and major alternates (if any) will be made available after the opening of Bids.

15 BIDS TO REMAIN OPEN

All Bids shall remain open for sixty days after the day of Bid opening. However, Owner may, in his sole discretion, release any Bid and return the Bid Security prior to that date.

16 AWARD OF CONTRACT

- 16.1 Owner reserves the right to reject any and all Bids, to waive any and all irregularities and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, non-responsive, or conditional bids. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

- 16.2 In evaluating Bids, Owner shall consider the qualification of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and unit prices if requested in the Bid forms. It is the Owner's intent to accept alternates (if any are

accepted) in the order in which they are listed in the Bid form, but Owner may accept them in any order or combination.

- 16.3. Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the Work as to which the identity of Subcontractors and other persons and organizations must be submitted as provided in the Supplementary Conditions. Operating costs, maintenance considerations, performance data, and guarantees of materials and equipment may also be considered by Owner.
- 16.4. Owner may conduct such investigations as he deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of the Bidders, proposed Subcontractors, and other persons and organizations to do the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- 16.5. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
- 16.6. If the contract is to be awarded, it will be awarded to the lowest bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project.
- 16.7. If the contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within sixty days after the day of the Bid opening.

17. PERFORMANCE AND OTHER BONDS

Provide all bonds as detailed in the Advertisement for Bids.

18. SIGNING OF AGREEMENT

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by at least three unsigned counterparts of the Agreement and all other Contract Documents. Within fifteen days thereafter, Contractor shall sign and deliver at least three counterparts of the Agreement to Owner with all other Contract Documents attached. Within ten days thereafter, Owner will deliver all fully signed counterparts to Engineer. Engineer will identify those portions of the Contract Documents not fully signed by Owner and Contractor and such identification shall be binding on all parties.

BID BOND

KNOWN ALL MEN BY THESE PRESENTS, that we, the undersigned, as CONTRACTOR, and _____ as Surety, are hereby held and firmly bound unto _____ as OWNER in the penal sum of payment of which, well and truly made, we hereby jointly and severally bind ourselves, successors, and assigns.

Signed, this ____ day of _____, 20__ .

The Condition of the above obligation is such that whereas the principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____ NOW, THEREFORE,

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

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

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

CONTRACTOR

By: _____ Witness: _____

Title: _____

Surety

By: _____ Witness: _____

Title: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located for federally funded projects.
Note: Bond may be declared invalid if not accompanied by Power of Attorney.

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____

County of _____

_____, being first duly sworn, deposes and says that:

(1) He is _____ of _____ and the Bidder that has submitted the attached BID;

(2) He is fully informed respecting the preparation and contents of the attached BID and of all pertinent circumstances respecting such BID;

(3) Such BID is genuine and is not a collusive or Sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed directly or indirectly with any other Bidder, firm or person to submit a collusive or sham BID in connection with the Contract for which the attached BID has been submitted, or to refrain from bidding in connection with such Contract; for which the attached Bid has been submitted, or to refrain from bidding in connection with such Contract; or has in any manner, directly or indirectly, sought by agreement, collusion, communication or conference with any other Bidder, firm or person to fix the price or prices in the attached BID or of any other Bidder, or to fix any overhead, profit or cost element of the BID price, or the BID price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement, any advantage against the City or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached UNIT PRICE BID SCHEDULE are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or parties in interest, including the affiant.

Subscribed and sworn to:

Signed: _____

before me this day:

Title: _____

____ of _____ 20____

My commission expires _____

(Name of Bidder)

(Address of Bidder)

organized and existing under the laws of the State of Tennessee and doing business as (indicate: "a corporation", "a partnership", "an individual", a "limited liability company" or otherwise, as applicable).

To: City of Dyersburg -Owner
Public Works Building
435 Highway 51 Bypass South
Dyersburg, TN 38025-1358

In compliance with your ADVERTISEMENT FOR BIDS, BIDDER hereby proposes to furnish all necessary labor, machinery, tools, apparatus, materials, equipment, services, and other necessary supplies in strict accordance with the terms and conditions of the plans, specifications and CONTRACT DOCUMENTS within the number of consecutive calendar days and at the prices set forth below for the construction of:

Project: City of Dyersburg: Restroom Facility for Forked Deer River Park

By submitting this BID, BIDDER certifies that this BID has been arrived at independently without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any other competitor.

BIDDER agrees, upon receipt of the NOTICE OF AWARD accompanied by the CONSTRUCTION CONTRACT and all required attachments, to cause same to be properly executed and returned to the CITY OF DYERSBURG within fifteen (15) days thereafter. BIDDER further agrees, upon receipt of the NOTICE TO PROCEED, (i) to commence work on the PROJECT not later than the last date stated in the Notice to Proceed as to which the BIDDER may commence to proceed, (ii) to achieve Substantial Completion of the PROJECT within ONEHUNDREDTWENTY(120) consecutive calendar days after such date, otherwise, to pay the CITY OF DYERSBURG as liquidated damages a sum as set forth in the Tennessee Department of Transportation Supplemental Specification Section 108.07 (based on Contract price) for each consecutive calendar day thereafter as provided in the GENERAL PROVISIONS; and (iii) to complete all Punch List items within thirty (30) consecutive calendar days after the date of Substantial Completion, as such date is determined by the CITY.

BIDDER agrees to perform all work described in the CONTRACT DOCUMENTS for the following unit price(s):

BID FORM

BASE BID:

Item	Unit	Unit Price	Qty	Total	Footnote
Mobilization/ Demobilization	LS		1		
Construction of new bathroom facility and all work shown on plans	LS		1		

Total Base Bid: _____

DEDUCTIVE ALTERNATE:

	Unit	Unit Price	Qty	Total	Footnote
Substitute wood bench in place of cast-in-place concrete bench	LS		1		See detail 1/A403
Substitute Hardie wall panel in place of metal wall panel Type M1	LS		1		See A403 Deduct #2
Substitute screw down metal wall panel in place of metal wall panel w continuous interlocking standing seam in wall. Type M1	LS		1		See A403 Deduct #3
Substitute painted T1-11 siding in place of cedar plank siding for wall. Type M2	LS		1		See A403 Deduct #4
Substitute painted TypeX gypsym board ceiling in place of cedar plank ceiling in TLT100, TLT101, TLT102, TLT103, Elect 104, TLT105, TLT106, Storage 107	LS		1		
Omit all floor drains in room TLT100, TLT101, TLT102, TLT103, Elect 104, TLT105, TLT106, Storage 107	LS		1		
Omit baby changing station in room TLT100, TLT101, TLT102, TLT103	LS		1		
Omit clear epoxy sealer & exterior varnish top coat (UV protection) on cedar plank siding in wall Type M2 and on all ceilings	LS		1		
Omit signage					See detail 1.1/A200
Omit power running to signage lighting					
Omit vent shroud					See detail 3.2/A200

Omit furr out. Omit light fixture in this detail and replace prefin metal vent with a circular soffit vent.					See detail 2/A402
Omit bench					See detail 3/A402
Omit walking path					See detail 2/A403

ADD ALTERNATE:

Item	Unit	Unit Price	Qty	Total	Footnote
8' wide gravel pathway	LS		1		See 2/A403
Provide planting					See 1/A101

TOTAL BID PRICE (show amount in both words and figures):

_____ and _____/100ths Dollars

\$ _____

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents

Submitted by: _____

Authorized Signature: _____ Date: _____

Name and Title: _____
(Type or print)

On behalf of: _____
(Name of Bidder)

Bidder's address: _____

(Please give Street and Mailing address if different)

Bidder's Telephone Number: _____

Bidder's Fax Number: _____

Bidder's contact's email address: _____

ADDENDA ACKNOWLEDGEMENT FORM

BIDDER acknowledges receipt of the following addenda (as applicable):

Addendum No. 1 _____	Dated _____
Addendum No. 2 _____	Dated _____
Addendum No. 3 _____	Dated _____

(Name of Bidder)

By: _____

Title: _____

CONSTRUCTION CONTRACT

Construction Contract made as of the ____ day of _____, 20____
Between THE CITY OF DYERSBURG (hereinafter referred to as "THE CITY") and
_____(hereinafter referred to as "CONTRACTOR").

In consideration of their acceptance of the terms and conditions stated below, the parties agree as follows:

ARTICLE 1 - THE CONTRACT DOCUMENTS

The Contract Documents consist of this Construction Contract and the terms and conditions stated herein below; the Advertisement for Bids dated May 4, 2024, attached as Exhibit A to this Contract; the Instructions for Bidders attached as Exhibit B to this Contract; the Bid Form of CONTRACTOR dated _____, attached as Exhibit C to this Contract; the Standard General Conditions and Supplemental Conditions attached collectively as Exhibit D to this Contract; the Technical Specifications, attached as Exhibit E to this Contract; the Certificate of Liability Insurance of Accord Corporation, insuring _____, attached as Exhibit F to this Contract; Performance Bond # _____ with _____ as surety in the amount of _____, attached as Exhibit G to this Contract; Payment Bond # _____ with _____ as surety in the amount of _____, attached as Exhibit H to this contract, the Notice of Award dated _____, attached as Exhibit I to this Contract; and the Notice to Proceed dated _____, attached as Exhibit J to this Contract.

ARTICLE 2 - THE WORK

The work agreed to be performed by CONTRACTOR under this Contract, known as **CITY OF DYERSBURG Forked Deer River Park Restroom Facility** (hereinafter "the Work") shall consist of, but is not limited to: erect restroom facility for Forked Deer River Park

The work shall also include the furnishing of all labor and equipment necessary and required for the safe, proper and expeditious performance of the Work.

ARTICLE 3 - ENGINEER

The Dyersburg City Engineer will act as the ENGINEER in connection with the completion of the project in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIME

As soon as practicable after the parties' execution of this Construction Contract, CONTRACTOR shall commence performance of the Work. Thereafter, CONTRACTOR shall diligently perform in order to complete the Work within one hundred twenty(120) calendar days of the commencement of the Work. The parties acknowledge and agree that time is of the essence of this Contract.

ARTICLE 5 - CONTRACT PRICE AND PAYMENT PROCEDURES

The Contract Price is_____. THE CITY shall make monthly progress payments to the CONTRACTOR based upon the CONTRACTOR'S Application for Payment, as approved by the ENGINEER.

ARTICLE 6 – LIQUIDATED DAMAGES

If the CONTRACTOR fails to complete the Work within the time stipulated in this Agreement, including any extensions of time for excusable delay as approved by the ENGINEER, the CONTRACTOR shall pay THE CITY liquidated damages in the amount of \$100 per day for each and every calendar day of delay, until the work is substantially Complete, as certified by the ENGINEER.

ARTICLE 7 - CHANGES IN THE WORK

THE CITY may, from time to time during the performance of the Work, order changes within the general scope of the Work. In such event, the parties may agree to an amendment of the Contract Price and/or time to compensate CONTRACTOR for additional work performed or materials furnished as a result of the change ordered in the Work.

ARTICLE 8 - TERMINATION

If CONTRACTOR shall be adjudged bankrupt or make general assignment for the benefit of creditors; or if a receiver should be appointed for CONTRACTOR or any of its property; or should CONTRACTOR persistently disregard instructions or fail to observe or perform any condition as required by the Contract, or fail to observe or perform any provision of the Contract or otherwise be guilty of a substantial violation of any provision of the Contract, then, THE CITY may, by at least five days' prior written notice to CONTRACTOR, without prejudice to any other rights or remedies available to THE CITY, terminate this Contract and CONTRACTOR's right to proceed with the Work. The above provisions are in addition to, and not in limitation of, the rights of THE CITY under the law or other provisions of this Contract.

ARTICLE 9 - ASSIGNMENT OF CONTRACT

CONTRACTOR shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without THE CITY's written consent. In case CONTRACTOR assigns all or any part of any money due or to become due under this Contract the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to CONTRACTOR, shall be subject to prior liens to all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work.

ARTICLE 10 - TAXES

CONTRACTOR shall pay and be responsible for any and all applicable federal, state

and local taxes assessed in connection with the furnishing of the services required by this Contract and shall indemnify and also hold THE CITY harmless therefore.

ARTICLE 11 - SAFETY AND HEALTH REGULATIONS

CONTRACTOR shall comply with all applicable labor safety and health regulations promulgated by the U.S. Department of Labor and the State of Tennessee, including without limitation the Occupational Safety and Health Act of 1970 (PL 91-596) and the Contract Work Hours and Safety Standards Act (PL 91-54). CONTRACTOR shall also grant to authorized representatives of THE CITY and the Department of Labor free access to all work areas for inspection.

ARTICLE 12 - INSURANCE

Prior to commencing the Work, CONTRACTOR shall purchase and maintain such comprehensive general liability and other insurance as is appropriate for the Work being performed and furnished and will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by CONTRACTOR, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

A. Claims under workers' or workmen's compensation, disability benefits and other similar employee benefit acts; where applicable;

B. Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

C. Claim for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

D. Claims for damages insured by personal injury liability coverage which are sustained:
(a) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR; or (b) by any other person for any other reason;

E. Claims for damages, other than to the Work itself, because of injury to or destruction

of tangible property wherever located, including loss of use resulting therefrom;

F. Claims arising out of operation of Laws or Regulations for damages because of bodily injury or death of any person or for damage to property; and

G. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

CONTRACTOR's general liability insurance shall also include coverage for the indemnification obligation to THE CITY assumed under Article 13 hereof.

The insurance required hereby shall include the specific coverage and be written for not less than the following stated limits of liability and coverage or limits of liability and coverage required by law, whichever is greater:

Comprehensive General Liability

1. Bodily Injury (including completed operations and products liability) and Property Damage: Combined single limit of \$1,000,000.00 each occurrence and \$1,000,000.00 aggregate.

2. Property damage liability insurance will provide explosion, collapse and underground coverage where applicable.

3. Personal injury, with employment exclusion deleted: combined single limit of \$1,000,000.00 each occurrence and aggregate.

Comprehensive Automobile Liability

Combined single limit of \$500,000.00 each occurrence.

Workers' Compensation and Employers Liability

All of the policies of insurance so required to be purchased and maintained (or the certificates or other evidence thereof) shall contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty (30) days' prior written notice has been given to THE CITY by certified mail. All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective work. In addition,

CONTRACTOR shall maintain such completed operations insurance for at least two years after final payment and furnish THE CITY with evidence of continuation of such insurance at final payment and one year thereafter.

ARTICLE 13 - INDEMNIFICATION

CONTRACTOR shall indemnify and hold harmless THE CITY, its agents and employees, from and against all claims, damages, losses and expenses, including attorneys' fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense: (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, and (b) is proximately caused by the negligent act or omission of CONTRACTOR, its subcontractors, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

ARTICLE 14 – NOTICES

All notices, demands, requests, instructions, approvals and claims issued or presented by either party to the other hereunder shall be in writing. All such written notices and communications shall be sufficiently given if sent by registered or certified mail, postage prepaid, addressed to the respective parties as follows:

If to THE CITY, then to:

Ms. Tiffany Heard, PE
City Engineer
City of Dyersburg
P.O. Box 1358
Dyersburg, Tennessee 38025-1358
(731) 288-2587

If to CONTRACTOR, then to:

ARTICLE 15 - MISCELLANEOUS PROVISIONS

A CONTRACTOR warrants that it is duly and lawfully qualified to conduct business in the State of Tennessee.

B This Contract sets forth the entire agreement and understanding of the parties in

respect of the transactions contemplated hereby and supersedes all prior agreements, communications and understandings relating to the subject matter hereof.

C. THE CITY and the CONTRACTOR each binds himself, his partners, successors, assigns, and legal representatives to the other party hereto in respect of all covenants, agreements and obligations contained in the Contract Documents.

D. This Contract shall not be amended or modified except by written instrument duly executed by both parties.

E. If there is any conflict between this Agreement and the General Conditions, or any other document incorporated herein by reference, the terms of this Agreement shall control.

(The remainder of this page is intentionally left blank)

IN WITNESS WHEREOF, the parties have executed this Construction Contract on the day and date first above said.

THE CITY OF DYERSBURG

By: _____

John Holden, Mayor

CONTRACTOR

By: _____

STATE OF
TENNESSEE COUNTY
OF DYER

PERSONALLY, APPEARED BEFORE ME, the undersigned Notary Public for County and State aforesaid, being duly commissioned and qualified, JOHN HOLDEN, with whom I am personally acquainted and who acknowledged himself to be the Mayor of the CITY OF DYERSBURG, a municipal corporation, and that he as such Mayor, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as such Mayor.

WITNESS MY HAND AND NOTARIAL SEAL of office in Dyersburg, Dyer County, Tennessee, this ___ day of _____, 2024.

My Commission Expires:

STATE OF TENNESSEE COUNTY OF DYER
Notary Public

_____ PERSONALLY, APPEARED BEFORE ME, the undersigned Notary Public for County and State aforesaid, being duly commissioned and qualified, _____, with whom I am personally acquainted and who acknowledged himself to be the Partner of the _____, a (*limited liability*) corporation, and that he as such Partner, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as such Partner.

WITNESS MY HAND AND NOTARIAL SEAL of office in Dyersburg, Dyer County, Tennessee, this _____ day of _____, 2024.

Notary Public
My Commission Expires:

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called
CONTRACTOR, (Corporation, Partnership, Individual, or Joint Venture)

and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the City of Dyersburg, hereinafter called OWNER, in the penal sum of _____ Dollars \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the CONTRACTOR has entered into a certain contract with the OWNER, dated the _____ day of _____ 2024, a copy of which is hereto attached and made a part of here of for the construction of: **CITY OF DYERSBURG Forked Deer River Park Restroom Facility**

NOW, THEREFORE, if the Contractor shall well, truly, and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full-force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the Work to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the Work or to the SPECIFICATIONS.

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

IN WITNESS WHEREOF, this instrument is executed in _____
(number)

counterparts, each one of which shall be deemed an original,
this the _____ day of _____, 20_____

ATTEST:

(Contractor) Secretary
(SEAL)

Contractor

By: _____

Title: _____

Address: _____

Witness to Contractor
Address

-

Surety

By: _____

Attorney-in-fact

Address _____

Witness to Surety

-

Note: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership all partners should execute BOND.

BOND is not valid unless accompanied by Power of Attorney.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is to be located.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that

(Name of Contractor)

(Address of Contractor)

A _____, hereinafter called CONTRACTOR, (Corporation,
Partnership, Individual, or Joint Venture)

and _____(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the City of Dyersburg, 435 Highway 51 Bypass South 38025-1358 hereinafter called OWNER, in the penal sum of Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the CONTRACTOR has entered into a certain contract with the OWNER, dated the ____day of _____, 20____, a copy of which is hereto attached and made a part of here for the construction of: CITY OF DYERSBURG Forked Deer River Park Restroom Facility

NOW, THEREFORE, if the CONTRACTOR shall promptly make payment to all persons, firms, Subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in such contract, and any authorized extension or modification thereof, including all amounts due to material, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment, and tools, consumed or used in connection with the construction of such Work, and all insurance premiums on said Work, and for all labor, performed in such Work whether by Subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the Work to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the Work or to the SPECIFICATIONS.

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

IN WITNESS WHEREOF, this instrument is executed in counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

(Contractor) Secretary

Contractor

(SEAL)

By _____

Title _____

Address _____

Witness to Contractor
Address

-

Surety

By _____
Attorney-in-fact

Address _____

Witness to Surety
Address

Note: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership all partners should execute BOND.

BOND is not valid unless accompanied by Power of Attorney.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is to be located.

NOTICE OF AWARD

TO: _____

PROJECT: **CITY OF DYERSBURG FDRP Restroom Facility**

THE OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated May 4, 2024 and information for Bidders

You are hereby notified that your BID has been accepted for items in the amount of:

You are required by the Information for Bidders to execute the Contract and furnish the required Contractor’s Performance Bond and Payment Bond within ten calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said bonds within ten days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER’S acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 2022.

ACCEPTANCE OF NOTICE
Receipt of the above
NOTICE OF AWARD is
hereby acknowledged

CITY OF DYERSBURG, TENNESSEE
Owner

By _____
John Holden
Title Mayor of the City of Dyersburg

By _____

this the _____ day of
_____, 20____.

Signature: _____

Title: _____

NOTICE TO PROCEED

TO: _____

PROJECT: **CITY OF DYERSBURG FDRP Restroom Facility** _____

You are hereby notified to commence work in accordance with the CONSTRUCTION CONTRACT dated _____, on or before _____, 2024, you are to complete the WORK within consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 2024.

City of Dyersburg, Tennessee
Owner

ACCEPTANCE OF NOTICE

Receipt of the above

By _____

NOTICE TO PROCEED is hereby acknowledged by

John Holden
Title Mayor of the City of Dyersburg

this the _____ day of _____, 2024.

By _____

Title



**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
RECREATION EDUCATIONAL SERVICES**

WR Snodgrass TN Tower, 312 Rosa L. Parks Avenue, 2nd Floor, Nashville, TN 37243
PH: 615-532-0748 FAX: 615-532-0732

**CERTIFICATION OF CONTRACTOR
REGARDING CONFLICTS OF INTEREST,
LOBBYING, NONDISCRIMINATION, PUBLIC ACCOUNTABILITY,
AND PUBLIC NOTICE**

This certification is required by the agency that has funded, in part, by: **(check one)**

- Local Park & Recreation Fund (LPRF)** **Land & Water Conservation Fund (LWCF)**
 Recreation Trail Program (RTP) **Other** _____

The Contractor, _____, by signing and submitting this Certification, acknowledges the following: This Certification will be incorporated into the Agreement executed between: _____ (*the Grantee*) and the Contractor.

By signing and submitting this Certification, the Contractor certifies that neither it, its principals nor affiliates has violated the following:

1. **Conflicts of Interest:** The Grantee warrants that no part of the total Grant Contract Amount shall be paid directly or indirectly to an employee or official of the State of Tennessee as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to the Grantee in connection with any work contemplated or performed relative to this Grant Contract.
2. **Lobbying:** The Grantee certifies to the best of its knowledge and belief that:
 - a. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this contract, grant, loan, or cooperative agreement, the Grantee shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.
 - c. The Grantee shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into and is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352.

3. **Nondiscrimination:** The Grantee hereby agrees, warrants, and assures that no person shall be excluded from participation in, be denied benefits of, or be otherwise subjected to discrimination in the performance of this Grant Contract or in the employment practices of the Grantee on the grounds of handicap or disability, age, race, color,

religion, sex, national origin, or any other classification protected by federal, Tennessee state constitutional, or statutory law. The Grantee shall, upon request, show proof of nondiscrimination and shall post in conspicuous places, available to all employees and applicants, notices of nondiscrimination.

4. Public Accountability: If the Grantee is subject to Tenn. Code Ann. § 8-4-401 *et seq.*, or if this Grant Contract involves the provision of services to citizens by the Grantee on behalf of the State, the Grantee agrees to establish a system through which recipients of services may present grievances about the operation of the service program. The Grantee shall also display in a prominent place, located near the passageway through which the public enters in order to receive Grant supported services, a sign at least eleven inches (11") in height and seventeen inches (17") in width stating:

NOTICE: THIS AGENCY IS A RECIPIENT OF TAXPAYER FUNDING. IF YOU OBSERVE AN AGENCY DIRECTOR OR EMPLOYEE ENGAGING IN ANY ACTIVITY WHICH YOU CONSIDER TO BE ILLEGAL, IMPROPER, OR WASTEFUL, PLEASE CALL THE STATE COMPTROLLER'S TOLL-FREE HOTLINE: 1-800-232-5454.

The sign shall be on the form prescribed by the Comptroller of the Treasury. The Grantor State Agency shall obtain copies of the sign from the Comptroller of the Treasury, and upon request from the Grantee, provide Grantee with any necessary signs.

5. Public Notice: All notices, informational pamphlets, press releases, research reports, signs, and similar public notices prepared and released by the Grantee in relation to this Grant Contract shall include the statement, "This project is funded under a grant contract with the State of Tennessee." All notices by the Grantee in relation to this Grant Contract shall be approved by the State.
6. Records: The Grantee and any approved subcontractor shall maintain documentation for all charges under this Grant Contract. The books, records, and documents of the Grantee and any approved subcontractor, insofar as they relate to work performed or money received under this Grant Contract, shall be maintained in accordance with applicable Tennessee law. In no case shall the records be maintained for a period of less than five (5) full years from the date of the final payment. The Grantee's records shall be subject to audit at any reasonable time and upon reasonable notice by the Grantor State Agency, the Comptroller of the Treasury, or their duly appointed representatives.

The records shall be maintained in accordance with Governmental Accounting Standards Board (GASB) Accounting Standards or the Financial Accounting Standards Board (FASB) Accounting Standards Codification, as applicable, and any related AICPA Industry Audit and Accounting guides.

In addition, documentation of grant applications, budgets, reports, awards, and expenditures will be maintained in accordance with U.S. Office of Management and Budget's Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.

Grant expenditures shall be made in accordance with local government purchasing policies and procedures and purchasing procedures for local governments authorized under state law.

The Grantee shall also comply with any recordkeeping and reporting requirements prescribed by the Tennessee Comptroller of the Treasury.

The Grantee shall establish a system of internal controls that utilize the COSO Internal Control - Integrated Framework model as the basic foundation for the internal control system. The Grantee shall incorporate any additional Comptroller of the Treasury directives into its internal control system.

Any other required records or reports which are not contemplated in the above standards shall follow the format designated by the head of the Grantor State Agency, the Central Procurement Office, or the Commissioner of Finance and Administration of the State of Tennessee.

**Grantee's Authorized Representative:
(USUALLY MAYOR)**

Signature

Print Name

Title

Date

CONTRACTOR: _____

Signature

Print Name

Title

Date

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: 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, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, 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.d. 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 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 classification and wage rates conformed under paragraph 1.b. 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.

b. (1) 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:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

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

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

(2) 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.

(3) 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 Wage and Hour Administrator for determination. The Wage and Hour 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.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) 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.

c. 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.

d. 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.

2. Withholding

The contracting agency 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, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, 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

a. 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. 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.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) 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:

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

(ii) 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;

(iii) 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.

(3) 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 3.b.(2) of this section.

(4) 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.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, 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 FHWA may, after written notice to the contractor, the contracting agency or the State DOT, 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

a. Apprentices (programs of the USDOL).

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, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, 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 Office of Apprenticeship Training, Employer and Labor Services 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 determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, 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.

b. Trainees (programs of the USDOL).

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.

c. 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.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

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 Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 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.

a. 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).

b. 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).

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

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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 therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), 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. The FHWA or the contracting agency 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 paragraph (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.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS
PREFERENCE FOR APPALACHIAN DEVELOPMENT
HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS
ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

BUY AMERICA CERTIFICATION

In accordance with 23 U.S.C. §313, and the implementing regulations at 23 C.F.R. §635.410, projects funded under the Recreational Trails Program (RTP), an assistance program of the U.S. Department of Transportation, Federal Highway Administration (FHWA) and described in 23 U.S.C. §206, will not be authorized to proceed unless the project either (i) includes no permanently incorporated steel or iron materials, or (ii) if steel or iron materials are to be used, all manufacturing processes, including application of a coating, for these materials must occur in the United States. A minimal use of foreign iron and steel material, not to exceed \$2,500, may be used in a project.

The following products contain steel or iron materials and are proposed to be permanently incorporated into a project funded under the Recreational Trails Program:

I hereby certify that these products will meet the requirements of 23 U.S.C. §313 and the applicable implementing regulations in 23 C.F.R. §635.410

Signature: _____

Printed Name: _____

Title: _____

Company Name: _____

Date: _____

Reviewed by: _____

Date: _____

TDEC – Recreation Resources Division

NOTICE OF AWARD

TO: _____

PROJECT: **CITY OF DYERSBURG Forked Deer River Park Restroom Facility**

THE OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated **May 4, 2024** and information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of

\$ _____

You are required by the Information for Bidders to execute the Contract and furnish the required Contractor's Performance Bond and Payment Bond within ten calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said bonds within ten days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20____.

ACCEPTANCE OF NOTICE
Receipt of the above
NOTICE OF AWARD is
hereby acknowledged

CITY OF DYERSBURG, TENNESSEE
Owner

By _____
John Holden
Title: Mayor of the City of Dyersburg

By: _____

this the _____ day of _____, 20__.

Signature: _____

Title: _____

NOTICE TO PROCEED

TO: _____

PROJECT: **CITY OF DYERSBURG Forked Deer River Park Restroom Facility**

You are hereby notified to commence work in accordance with the CONSTRUCTION CONTRACT dated _____, on or before _____, 20____, you are to complete the WORK within consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 20_____.

ACCEPTANCE OF NOTICE
City of Dyersburg,
Receipt of the above

Tennessee Owner

By _

NOTICE TO PROCEED is
hereby acknowledged by

John Holden
Title Mayor of the City of Dyersburg

this the _____ day of
_____, 20_____.

By _____

Title

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1—Definitions and Terminology.....	1
1.01 Defined Terms.....	1
1.02 Terminology	6
Article 2—Preliminary Matters	7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance.....	7
2.02 Copies of Documents	7
2.03 Before Starting Construction	7
2.04 Preconstruction Conference; Designation of Authorized Representatives.....	8
2.05 Acceptance of Schedules	8
2.06 Electronic Transmittals	8
Article 3—Contract Documents: Intent, Requirements, Reuse.....	9
3.01 Intent.....	9
3.02 Reference Standards.....	9
3.03 Reporting and Resolving Discrepancies	10
3.04 Requirements of the Contract Documents.....	10
3.05 Reuse of Documents	11
Article 4—Commencement and Progress of the Work	11
4.01 Commencement of Contract Times; Notice to Proceed.....	11
4.02 Starting the Work.....	11
4.03 Reference Points	11
4.04 Progress Schedule.....	12
4.05 Delays in Contractor’s Progress	12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	13
5.01 Availability of Lands	13
5.02 Use of Site and Other Areas.....	14
5.03 Subsurface and Physical Conditions.....	15
5.04 Differing Subsurface or Physical Conditions	16

5.05	Underground Facilities	17
5.06	Hazardous Environmental Conditions at Site	19
Article 6—Bonds and Insurance.....		21
6.01	Performance, Payment, and Other Bonds.....	21
6.02	Insurance—General Provisions.....	22
6.03	Contractor’s Insurance.....	24
6.04	Builder’s Risk and Other Property Insurance.....	25
6.05	Property Losses; Subrogation	25
6.06	Receipt and Application of Property Insurance Proceeds	27
Article 7—Contractor’s Responsibilities		27
7.01	Contractor’s Means and Methods of Construction	27
7.02	Supervision and Superintendence	27
7.03	Labor; Working Hours	27
7.04	Services, Materials, and Equipment	28
7.05	“Or Equals”.....	28
7.06	Substitutes	29
7.07	Concerning Subcontractors and Suppliers.....	31
7.08	Patent Fees and Royalties.....	32
7.09	Permits	33
7.10	Taxes	33
7.11	Laws and Regulations.....	33
7.12	Record Documents.....	33
7.13	Safety and Protection.....	34
7.14	Hazard Communication Programs	35
7.15	Emergencies.....	35
7.16	Submittals	35
7.17	Contractor’s General Warranty and Guarantee	38
7.18	Indemnification	39
7.19	Delegation of Professional Design Services	39
Article 8—Other Work at the Site.....		40
8.01	Other Work	40
8.02	Coordination	41
8.03	Legal Relationships.....	41

Article 9—Owner’s Responsibilities	42
9.01 Communications to Contractor	42
9.02 Replacement of Engineer	42
9.03 Furnish Data	42
9.04 Pay When Due.....	42
9.05 Lands and Easements; Reports, Tests, and Drawings	43
9.06 Insurance.....	43
9.07 Change Orders	43
9.08 Inspections, Tests, and Approvals.....	43
9.09 Limitations on Owner’s Responsibilities	43
9.10 Undisclosed Hazardous Environmental Condition.....	43
9.11 Evidence of Financial Arrangements.....	43
9.12 Safety Programs	43
Article 10—Engineer’s Status During Construction	44
10.01 Owner’s Representative.....	44
10.02 Visits to Site.....	44
10.03 Resident Project Representative.....	44
10.04 Engineer’s Authority	44
10.05 Determinations for Unit Price Work	45
10.06 Decisions on Requirements of Contract Documents and Acceptability of Work	45
10.07 Limitations on Engineer’s Authority and Responsibilities	45
10.08 Compliance with Safety Program.....	45
Article 11—Changes to the Contract	46
11.01 Amending and Supplementing the Contract	46
11.02 Change Orders	46
11.03 Work Change Directives.....	46
11.04 Field Orders.....	47
11.05 Owner-Authorized Changes in the Work.....	47
11.06 Unauthorized Changes in the Work.....	47
11.07 Change of Contract Price	47
11.08 Change of Contract Times.....	49
11.09 Change Proposals.....	49
11.10 Notification to Surety.....	50

Article 12—Claims.....	50
12.01 Claims.....	50
Article 13—Cost of the Work; Allowances; Unit Price Work	51
13.01 Cost of the Work	51
13.02 Allowances	55
13.03 Unit Price Work.....	55
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	56
14.01 Access to Work.....	56
14.02 Tests, Inspections, and Approvals.....	56
14.03 Defective Work	57
14.04 Acceptance of Defective Work.....	58
14.05 Uncovering Work	58
14.06 Owner May Stop the Work	58
14.07 Owner May Correct Defective Work.....	59
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period	59
15.01 Progress Payments.....	59
15.02 Contractor’s Warranty of Title	62
15.03 Substantial Completion.....	62
15.04 Partial Use or Occupancy	63
15.05 Final Inspection	64
15.06 Final Payment.....	64
15.07 Waiver of Claims	65
15.08 Correction Period.....	66
Article 16—Suspension of Work and Termination	67
16.01 Owner May Suspend Work	67
16.02 Owner May Terminate for Cause.....	67
16.03 Owner May Terminate for Convenience.....	68
16.04 Contractor May Stop Work or Terminate	68
Article 17—Final Resolution of Disputes	69
17.01 Methods and Procedures.....	69
Article 18—Miscellaneous	69
18.01 Giving Notice	69
18.02 Computation of Times	69

18.03	Cumulative Remedies	70
18.04	Limitation of Damages	70
18.05	No Waiver	70
18.06	Survival of Obligations	70
18.07	Controlling Law	70
18.08	Assignment of Contract	70
18.09	Successors and Assigns	70
18.10	Headings.....	70

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents;
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. 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.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* 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 structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

- Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
 - F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
 - G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
 - H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
 - I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
 - J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
 - K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, 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 performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner 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 which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract 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 on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is 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 assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 01 PROJECT TITLE PAGE

DIVISION 03 - CONCRETE

03 10 00 CONCRETE FORMING AND ACCESSORIES

03 20 00 CONCRETE REINFORCING

03 30 00 CAST-IN-PLACE CONCRETE

DIVISION 05 - METALS

05 12 00 STRUCTURAL STEEL FRAMING

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 10 00 ROUGH CARPENTRY

06 17 53 SHOP-FABRICATED WOOD TRUSSES

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 21 00 THERMAL INSULATION

07 21 02 UNDERSLAB VAPOR BARRIER

07 28 00 ROOF UNDERLAYMENT

07 41 13 METAL ROOF PANELS

07 42 13 METAL WALL PANELS

07 62 00 SHEET METAL FLASHING AND TRIM

07 92 00 JOINT SEALANTS

DIVISION 08- OPENINGS

08 11 13 HOLLOW METAL DOORS AND FRAMES

08 71 00 DOOR HARDWARE

DIVISION 09- FINISHES

09 90 00 PAINTING

DIVISION 10- SPECIALTIES

10 20 00 LOUVERS AND VENTS

10 05 20 FIRE EXTINGUISHERS

10 08 00 TOILET ACCESSORIES

DIVISION 22 - PLUMBING

22 05 00 COMMON WORK RESULTS FOR PLUMBING

22 05 23 VALVES FOR PLUMBING PIPING

22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

22 07 00 PLUMBING INSULATION

22 11 16 DOMESTIC WATER PIPING

22 11 19 DOMESTIC WATER PIPING SPECIALTIES

22 13 16 STORM AND SANITARY WASTE AND VENT PIPING

22 13 19 SANITARY WASTE PIPING SPECIALTIES

22 33 36 WATER HEATER - ELECTRIC

22 40 00 PLUMBING FIXTURES

22 46 00 SECURITY PLUMBING FIXTURES

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

23 01 30.51 HVAC AIR-DISTRIBUTION SYSTEM CLEANING

23 05 00 COMMON WORK RESULTS FOR HVAC

23 05 13 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

23 05 48 VIBRATION ISOLATION

23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

23 31 13 SHEETMETAL DUCTWORK

23 33 00 AIR DUCT ACCESSORIES

23 82 39 TERMINAL HEATING DEVICES

DIVISION 26 - ELECTRICAL

26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

26 05 33.13 CONDUIT FOR ELECTRICAL SYSTEMS

26 05 33.16 BOXES FOR ELECTRICAL SYSTEMS
26 05 48 VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 09 23 LIGHTING CONTROL DEVICES
26 21 00 LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 51 00 INTERIOR LIGHTING
26 56 00 EXTERIOR LIGHTING

DIVISION 31 - EARTHWORK

31 23 16.13 TRENCHING

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

**SECTION 00 01 01
PROJECT TITLE PAGE**

FOR

DYERSBURG RESTROOM FACILITY

DYERSBURG, TENNESSEE

DATE: JANUARY 2024

PREPARED BY: SMITH, SECKMAN, REID

URBAN ARCH ASSOCIATES

END OF SECTION

**SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
- D. Samples: Submit two, 12 inch (305 mm) long samples of waterstops and construction joint devices.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.
- B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Chamfer outside corners of beams, joists, columns, and walls.
- D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.
- E. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.
- F. Comply with Highways standards of the State of Tennessee.
- G. Use the following form types:
 - 1. Basement Walls Not Exposed To View: Site fabricated plywood.
 - 2. Basement Walls Exposed To View: Site fabricated rough sawn lumber.
 - 3. Elevated Floor Slabs: Prefabricated glass fiber pan forms, treated for exposed to view finish.
 - 4. Elevated Floor/Roof Slabs: Permanent prefabricated foam panel formwork; formwork to remain.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2.02 WOOD FORM MATERIALS

- A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- B. Lumber: SYP species; NO. 2 grade; with grade stamp clearly visible.

2.03 REMOVABLE PREFABRICATED FORMS

- A. Pan Type: Glass fiber, of size and profile indicated.
- B. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes indicated.
- C. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches (50 mm) thick.

2.04 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, 3/4 inch back break dimension, (20 mm back break dimension,) free of defects that could leave holes larger than 1 inch (25 mm) in concrete surface.
- B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
 - 1. Composition: Colorless, reactive, water-based or solvent-based compound.
 - 2. Do not use materials containing diesel oil or petroleum-based compounds.
 - 3. VOC Content: In compliance with applicable local, State, and federal regulations.
 - 4. Products:
 - a. Nox-Crete Inc; Quick Release Series: www.nox-crete.com/#sle.
 - b. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; Duogard: www.wrmeadows.com/#sle.
- C. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.
- D. Filler Strips for Chamfered Corners: Rigid plastic type; ____ x ____ inch (____ x ____ mm) size; maximum possible lengths. Provide _____ manufactured by _____.
- E. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.
- F. Waterstops: PVC, complying with COE CRD-C 572.
 - 1. Configuration: As indicated on drawings.
 - 2. Size: As indicated on drawings.
 - 3. Manufacturers:
 - a. BoMetals, Inc: www.bometals.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Install stay in place mesh steel formwork in accordance with manufacturer's recommendations.
- D. Install permanent insulated foam panel formwork per manufacturer's recommendations.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- F. Align joints and make watertight. Keep form joints to a minimum.
- G. Obtain approval before framing openings in structural members that are not indicated on drawings.
- H. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- I. Coordinate this section with other sections of work that require attachment of components to formwork.
- J. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean and protect permanent insulated concrete foam panel formwork per manufacturer's recommendations.
- C. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.
- B. Construct permanent insulated foam panel formwork to maintain tolerances required by ACI 301.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- C. Do not reuse wood formwork more than 5 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

**SECTION 03 20 00
CONCRETE REINFORCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 04 20 00 - Unit Masonry: Reinforcement for masonry.
- D. Section 04 29 00 - Engineered Unit Masonry: Reinforcement for engineered masonry.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.
 - 1. Maintain one copy of each document on project site.
- B. Provide Architect with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
 - 1. Deformed billet-steel bars.
- B. Reinforcing Steel Mat: ASTM A704/A704M, using ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa) steel bars or rods, unfinished.
- C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.
 - 2. WWR Style: As indicated on drawings.
- D. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch (1.29 mm).
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel components for placement within 1-1/2 inches (38 mm) of weathering surfaces.

2.03 RE-BAR SPLICING:

- A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
- B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- C. Grout: Cementitious, non-metallic, non-shrink grout for use with manufacturer's grout sleeve reinforcing bar coupler system.
 - 1. Products:
 - a. Dayton Superior Corporation; _____: www.daytonsuperior.com/#sle.

2.04 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as follows:
 - 1. Beams: 1.5 inch (40 mm)
 - 2. Supported Slabs and Joists: 3/4 inch (____ mm).
 - 3. Column Ties: 1.5 inch (40 mm).
 - 4. Walls (exposed to weather or backfill): 2.0 inch (50 mm).
 - 5. Footings and Concrete Formed Against Earth: 3.0 inch (____ mm).
 - 6. Slabs on Fill: 2.0 inch (50 mm).
- E. Comply with applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete foundations and slab on grade.
- B. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.
- C. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcing.

1.03 REFERENCE STANDARDS

- A. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- B. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
- C. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- D. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens).
- E. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
- F. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
- G. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- H. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
- I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
- J. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
- K. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- L. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- N. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.
- O. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric).
- P. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- Q. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- R. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design.
 1. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- G. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
- H. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
 1. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 03 20 00.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I or Type II Portland type.
 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 1. Acquire aggregates for entire project from same source.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Chemical Admixture:
 1. Manufacturers:
 - a. W.R. Meadows.
 - b. Euclid.
 - c. BASF
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Air Entrainment Admixture: ASTM C260/C260M.
- D. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- F. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- G. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- H. Accelerating Admixture: ASTM C494/C494M Type C.
- I. Retarding Admixture: ASTM C494/C494M Type B.
- J. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:
 - 1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
 - 2. Installation: Comply with ASTM E1643.
 - 3. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
 - 4. Manufacturers:
 - a. ISI Building Products; Viper VaporCheck II 15-mil (Class A): www.isibp.com/#sle.
 - b. Stego Industries, LLC; 15 mil : www.stegoindustries.com/#sle.
 - c. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): www.wrmeadows.com/#sle.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Height Change, Plastic State; when tested in accordance with ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.
 - 3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch (48 MPa).
 - 4. Flowable Products:
 - a. Euclid Chemical Company; NS GROUT: www.euclidchemical.com/#sle.
 - b. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; DURAGROUT: www.laticrete.com/our-products/concrete-construction-chemicals/#sle.
 - c. W. R. Meadows, Inc; CG-86: www.wrmeadows.com/#sle.
 - 5. Low-Slump, Dry Pack Products:
 - a. Euclid Chemical Company; DRY PACK GROUT: www.euclidchemical.com/#sle.
 - b. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; Duragrout: www.lmcc.com/#sle.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
 - 1. Manufacturers:
 - a. Euclid Chemical Company; AKKRO-7T: www.euclidchemical.com/#sle.
 - b. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
- B. Epoxy Bonding System:
 - 1. Complying with ASTM C881/C881M and of Type required for specific application.
 - 2. Manufacturers:
 - a. Euclid Chemical Company; DURAL FAST SET LV: www.euclidchemical.com/#sle.
 - b. Euclid Chemical Company; DURALFLEX GEL: www.euclidchemical.com/#sle.
 - c. W. R. Meadows, Inc; Rezi-Weld Gel Paste, Rezi-Weld Gel Paste State, Rezi-Weld 1000: www.wrmeadows.com/#sle.
- C. Waterstops: PVC, complying with COE CRD-C 572.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Configuration: As indicated on drawings.
2. Size: As indicated on drawings.
3. Manufacturers:
 - a. BoMetals, Inc; _____: www.bometals.com/#sle.
- D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches (150 mm) on center; ribbed steel stakes for setting.
 1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
 2. Height: To suit slab thickness.
 3. Manufacturers:
 - a. BoMetals, Inc: www.bometals.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Dowel Sleeves: Plastic sleeve for smooth, round, steel load-transfer dowels.
- F. Plate Dowel System: Steel plate dowel and plastic dowel sleeve; with integral fasteners for attachment to formwork.
 1. Manufacturers:
 - a. BoMetals, Inc: www.bometals.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
 1. Manufacturers:
 - a. Euclid Chemical Company ; EUCOBAR: www.euclidchemical.com/#sle.
 - b. W. R. Meadows, Inc ; Evapre or Evapre-RTU: www.wrmeadows.com/#sle.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
 1. Manufacturers:
 - a. SpecChem, LLC; SpecRez: www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; 1100-Clear: www.wrmeadows.com/#sle.
- C. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.
 1. Vehicle: Water-based.
 2. Manufacturers:
 - a. SpecChem, LLC; Cure and Seal WB: www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; VOCOMP-20: www.wrmeadows.com/#sle.
- D. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
 1. Vehicle: Solvent-based.
 2. Manufacturers:
 - a. Euclid Chemical Company; SUPER DIAMOND CLEAR: www.euclidchemical.com/#sle.
 - b. Kaufman Products Inc; Krystal 25: www.kaufmanproducts.net/#sle.
 - c. W. R. Meadows, Inc; CS-309-25: www.wrmeadows.com/#sle.
- E. Curing and Sealing Compound, High Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
 1. Vehicle: Solvent-based.
 2. Manufacturers:
 - a. Kaufman Products Inc; Krystal 25: www.kaufmanproducts.net/#sle.
 - b. SpecChem, LLC; Cure and Seal WB: www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; Decra-Seal: www.wrmeadows.com/#sle.
- F. Moisture-Retaining Sheet: ASTM C171.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Curing paper, regular.
 2. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch (0.102 mm).
- G. Polyethylene Film: ASTM D2103, 4 mil, 0.004 inch (0.102 mm) thick, clear.
- H. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Normal Weight Concrete: Foundations
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch (27.6 MPa).
 2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
 3. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
 4. Water-Cement Ratio: Maximum 40 percent by weight.
 5. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
 6. Maximum Slump: 4 inches (100 mm).
 7. Maximum Aggregate Size: 3/4 inch (19 mm).
- E. Normal Weight Concrete: Slab on grade (interior and exterior)
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4500 pounds per square inch (31.0 MPa).
 2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
 3. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
 4. Water-Cement Ratio: Maximum 40 percent by weight.
 5. Total Air Content: 6 percent, determined in accordance with ASTM C173/C173M.
 6. Air Entrained admixture
 7. Maximum Slump: 4 inches (100 mm).
 8. Maximum Aggregate Size: 3/4 inch (19 mm).
- F.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 2. Use latex bonding agent only for non-load-bearing applications.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
 - 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 - 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 - 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.06 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
 3. Decorative Exposed Surfaces: Trowel as described in ACI 302.1R; take measures necessary to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.
 4. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.07 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 1. Normal concrete: Not less than seven days.
 2. High early strength concrete: Not less than four days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet.
 - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 3. Final Curing: Begin after initial curing but before surface is dry.
 - a. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site 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 concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 75 cubic yards (57 cu m) or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.09 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

**SECTION 05 12 00
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Base plates, and wood beam connection plates.
- B. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 Rough Carpe
- B. Scetion 04 20 00 Unit Masonry

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- D. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
- E. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
- F. ASTM E94/E94M - Standard Guide for Radiographic Examination Using Industrial Radiographic Film.
- G. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments.
- H. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry.
- I. ASTM E709 - Standard Guide for Magnetic Particle Testing.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
- K. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections.
- L. SSPC-SP 3 - Power Tool Cleaning.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- E. Fabricator's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- C. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- B. Rolled Steel Structural Shapes: ASTM A992/A992M.
- C. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- D. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- E. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
- F. Headed Anchor Rods: ASTM F1554 Grade 36, plain.
- G. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Welded Connections: Visually inspect all field-welded connections and test at least 100 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94/E94M.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2. Ultrasonic testing performed in accordance with ASTM E164.
3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Sheathing.
- C. Preservative treated wood materials.
- D. Miscellaneous framing and sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 06 17 53 - Shop-Fabricated Wood Trusses.

1.03 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood.
- F. PS 20 - American Softwood Lumber Standard.
- G. SPIB (GR) - Grading Rules.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. Samples: For rough carpentry members that will be exposed to view, submit two samples, ___by___ inch (___by___ mm) in size illustrating wood grain, color, and general appearance.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- F. Hardware Submittal: Develop shop drawings for each building listing and locating all hardware, anchors, anchor bolts, holdowns, coil straps, and roof truss connections listed in the construction documents for review and approval. each submittal shall have the following information .
 - 1. Submittal shall contain floor and roof plans and related sections to scale for each building.
 - 2. Submittal shall clearly locate hardware in floor or roof plans and in related sections for each building on each level.
 - 3. Submittal shall include manufacturer's literature and cut sheets for each type of hardware listed.
 - 4. If substitution hardware is submitted other than the hardware listed substitution must contain manufacturer's literature for submitted substitution hardware as well as the manufacturer's literature of the specified hardware products

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm)):
 - 1. Grade: No. 2.
- E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm)):
 - 1. Species: Southern Pine.
 - 2. Grade: No. 2.
- F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings.
- C. Surfacing: S4S.
- D. Moisture Content: S-dry or MC19.
- E. Stud Framing (2 by 2 through 2 by 6 (50 by 50 through 50 by 150 mm)):
 - 1. Species: Southern Pine.
 - 2. Grade: no. 2.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 through 100 by 400 mm)):
 - 1. Species: Southern Pine.
 - 2. Grade: No. 2.

2.04 STRUCTURAL COMPOSITE LUMBER

- A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
 - 1. Beams: Use laminated veneer lumber with manufacturer's published modulus of elasticity, E: 1,900,000 psi (13.1 MPa), minimum.
 - 2. Manufacturers:
 - a. Boise Cascade Company; ____: www.bc.com/#sle.
 - b. Weyerhaeuser Company; ____: www.weyerhaeuser.com/#sle.
 - 1) Microlam LVL
 - c. _____.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 CONSTRUCTION PANELS

- A. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
1. Grade: Sheathing.
 2. Bond Classification: Exposure 1.
 3. Performance Category: 3/4" PERF CAT.
 4. Span Rating: 48/24 (_____).
 5. Edges: Square.
 6. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 500 days.
 7. Provide fastening guide on top panel surface with separate markings indicating fastener spacing for 16 inches (406 mm) and 24 inches (610 mm) on center, respectively.
- B. Wall Sheathing: Oriented strand board wood structural panel; PS 2.
1. Grade: Sheathing.
 2. Bond Classification: Exposure 1.
 3. Performance Category: 5/8 PERF CAT.
 4. Span Rating: 40/20.
 5. Edges: Square.

2.06 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
- B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
 2. Manufacturers:
 - a. Simpson Strong Tie .
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
 2. Manufacturers:
 - a. Simpson Strong Tie.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Sill Gasket on Top of Foundation Wall: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.
- E. Sill Flashing: As specified in Section 07 62 00.
- F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
1. Manufacturers:
 - a. Franklin International, Inc; Titebond Fast Set Polyurethane Construction Adhesive: www.titebond.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- G. General Purpose Construction Adhesives:
1. Manufacturers:
 - a. ADFAST Corporation; ADBOND EX 5690: www.adfastcorp.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Water-Resistive Barrier: As specified in Section 07 25 00.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2.07 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
 - 1. Manufacturers:
 - a. Lonza Group: www.wolmanizedwood.com/#sle.
 - b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 - e. Treat lumber less than 18 inches (450 mm) above grade.
 - f. Treat lumber in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches (100 mm) and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges use sheathing clips where joints occur between roof framing members.
 - 2. Nail panels to framing; staples are not permitted. Refer to drawings for nailing pattern and nail size
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails.
 - 1. At long edges provide solid edge blocking where joints occur between wall studs
 - 2. Nail panels to framing; staples are not permitted. Refer to drawings for nailing pattern and nail size
- D. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.08 FIELD QUALITY CONTROL

- A. Coordination of ABAA Tests and Inspections:
 - 1. Provide testing and inspection required by ABAA QAP.
 - 2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
 - 3. Cooperate with ABAA testing agency.
 - 4. Allow access to air barrier work areas and staging.
 - 5. Do not cover air barrier work until tested, inspected, and accepted.

3.09 CLEANING

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated wood trusses for roof framing.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Installation requirements for miscellaneous framing.
- B. Section 06 10 00 - Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.
 - 1. Include identification of engineering software used for design.
 - 2. Provide shop drawings stamped or sealed by design engineer.
 - 3. Submit design calculations.
 - 4. Shop drawings and design calculations shall be signed and sealed by Professional Engineer responsible for their design and licensed in the State in Which the Project is Located
- C. Designer's Qualification Statement.
- D. Fabricator's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design by or under direct supervision of a Professional Engineer experienced in design of this Work and licensed in State in Which the Project is Located.
- B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle and erect trusses in accordance with TPI BCSI 1.
- B. Store trusses in vertical position resting on bearing ends.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Truss Plate Connectors:
 - 1. Alpine, an ITW Company: www.alpineitw.com/#sle.
 - 2. MiTek Industries, Inc: www.mii.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Truss Fabricators:
 - 1. RedBuilt LLC; Open Web Trusses: www.redbuilt.com/#sle.
 - 2. _____.
 - 3. _____.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2.02 TRUSSES

- A. Wood Trusses: Designed and fabricated in accordance with ANSI/TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
 - 1. Species and Grade: Southern Pine, SPIB (GR) Grade no 2.
 - 2. Connectors: Steel plate.
 - 3. Design Roof Live Load: 25 lbs/sq ft (1.2 kPa).
 - a. Live Load Top Chord: 20 lbs/sq ft (0.96 kPa)
 - b. Live Load Bottom Chord: 5 lbs/sq ft (0.24 kPa)
 - 4. Design Roof Dead Load : 20 lb/sq ft (0.96 kPa)
 - a. Dead load Top Chord: 10 lbs/ sq ft (0.48 kPa)
 - b. Dead Load Bottom Chord: 10 lbs/ sq ft (0.48 kPa)
 - 5. Design Wind Loads: IBC 2021/ ASCE7-16
 - a. Design Wind Speed: 105mph
 - b. Exposure Category: B
 - c. Enclosure Classification: Enclosed
 - 6. Roof Deflection: 1/240, maximum.

2.03 MATERIALS

- A. Lumber:
 - 1. Moisture Content: Between 7 and 9 percent.
 - 2. Lumber fabricated from old growth timber is not permitted.
- B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.
- C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.04 ACCESSORIES

- A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: Softwood lumber, any species, construction grade, 19 percent maximum and 7 percent minimum moisture content.
- B. Fasteners: Electrogalvanized steel, type to suit application.
- C. Bearing Plates: Electrogalvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that supports and openings are ready to receive trusses.

3.02 PREPARATION

- A. Coordinate placement of bearing items.

3.03 ERECTION

- A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.
- B. Set members level and plumb, in correct position.
- C. Do not field cut or alter structural members without approval of Architect.
- D. Install permanent bridging and bracing.
- E. Install headers and supports to frame openings required.
- F. Frame openings between trusses with lumber in accordance with Section 06 10 00.
- G. Coordinate placement of decking with work of this section.
- H. After erection, touch-up primed surfaces with primer consistent with shop coat.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

3.04 TOLERANCES

- A. Framing Members: 1/2 inch (12 mm) maximum, from true position.

END OF SECTION

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation in ceiling construction.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- E. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
 - 1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.
 - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Thermal Resistance: R-value (RSI-value) of 30.
 - 3. Thickness: 12 1/ inch
 - 4. Products:
 - a. Owens Corning Corporation; EcoTouch PINK FIBERGLASS Insulation: www.ocbuildingspec.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- B. Enclosure for Recessed Ceiling Fixtures: Mineral fiber insulation box enclosure with foil facing on exterior side for placement over recessed ceiling light fixture; flame spread index of 25 (twenty five) and smoke development index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Light Fixture Size: As indicated on drawings.

2.03 ACCESSORIES

- A. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

END OF SECTION

**SECTION - 07212
UNDERSLAB VAPOR BARRIER**

PART 1: GENERAL

1.1 SUMMARY

A. Products Supplied Under This Section:

1. Vapor Barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.

1.2 RELATED SECTIONS

- A. Section 03100 – Concrete Formwork and Accessories
- B. Section 03200 – Concrete Reinforcement

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 1745-97 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil, or Granular Fill Under Concrete Slabs
2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):

1. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) not less than 15 mils thick.

1.4 SUBMITTALS

A. Quality Control / Assurance:

1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
2. Manufacturer's samples, literature
3. Manufacturer's installation instructions for placement, seaming and pipe boot installation

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vapor Barrier:

1. Vapor Barrier must have the following qualities:
 - a. WVTR less than 0.008 as tested by ASTM E-96.
 - b. ASTM E-1745 Class A (Plastics).

2.2 MANUFACTURERS

**Dyersburg Restroom Facility
Tennessee, Dyersburg**

- A. Basis-of-Design Product: The design for under-slab vapor barrier is based on Stego Wrap (10 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com . Subject to compliance with requirements, provide the named product or a comparable product by one of the following manufacturers.
 - 1. W.R. Meadows Premoulded Membrane with Plasmatic Core.
 - 2. Zero-Perm by Polyguard.

2.3 ACCESSORIES

- A. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.
- B. Pipe Boots: Construct pipe boots from Vapor Barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by Architect/Engineer:
 - 1. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION

- A. Vapor Barrier Installation:
 - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98.
 - a. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Barrier over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) with manufacturer's pipe boot.
 - e. No penetration of the Vapor Barrier is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Barrier, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION

**SECTION 072800
SYNTHETIC AND RUBBERIZED ROOF UNDERLAYMENTS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Synthetic roof underlayments.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 2. ASTM D751 - Standard Test Methods for Coated Fabrics.
 3. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 4. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 5. ASTM D1777 - Standard Test Method for Thickness of Textile Materials.
 6. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing.
 7. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
 8. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 9. ASTM D4869 - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
 10. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 11. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.
 12. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
- B. International Code Council (ICC):
 1. ICC AC-08 - Acceptance Criteria for Tile Underlayment
 2. ICC AC 48 - Acceptance Criteria for Roof Underlayment For Use In Severe Weather Climates.
 3. ICC-ES AC188 - Roof Underlayments.
- C. CSA Group (CSA):
 1. CSA A 123.3 - Asphalt Saturated Organic Roofing Felt.
- D. QAI Laboratories (QAI):
 1. QAI B1040-2 - System Components Underlayment.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
 - 5. Copy of manufacturer's lifetime limited warranty.
- C. Verification Samples: Two representative units of each type, size, pattern and color.
- D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations. As recommended by manufacturer, store materials at lower temperature between 40 and 100 degrees F (4.4 and 37.8 degrees C).
- C. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original unopened, undamaged containers with identification labels intact.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements and Conditions: Weather Conditions: Neither commence nor proceed with the underlayment application when frost is present or inclement weather conditions conflict with manufacturer's published requirements.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard limited warranty.
 - 1. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative, heating and ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of System Components Corporation and System Components Corporation shall not be responsible for any claims, repairs, restoration or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins or the like in any building or in the air, land or water serving the building.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: SystemComponents Corporation, which is located at: 10 W. Streetsboro St. Suite 207; Hudson, OH 44236; Tel: 330-528-0255; Fax: 330-528-0846; Email:[request info \(support@systemcomponents.net\)](mailto:request%20info%20support@systemcomponents.net); Web:<http://systemcomponents.net>
- B. Substitutions: Permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SYNTHETIC ROOF UNDERLAYMENTS

- A. Basis of Design: CoverPRO 1000 Synthetic Roofing Underlayment Membrane System as manufactured and supplied by System Components Company Incorporated.
 - 1. Features:
 - a. Proprietary non-woven walking surface improves roof deck walkability in all conditions.
 - b. Each 10 square roll weighs approximately 17 lbs (7.71 kg) and is attached with standard roof nails. Plastic caps not needed.
 - c. Unique four layer construction makes it 25 times stronger than No. 15 roofing felt and 12 times stronger than No. 30 roofing felt. It requires significantly fewer fasteners and provides a tough, durable deck cover regardless of weather conditions.
 - d. Color: Gray. Provides a comfortable working surface in all temperatures.
 - e. Advertise big and bold Broadcast Custom Print:
 - 1) To get leads or earn paid advertising revenue during your project.
 - 2) With Broadcast Custom Print your individual logo, phone number, web address and any other advertisements can be featured on rolls, with individual images, up to 3 feet (914 mm) tall and 10 feet (3048 mm) wide.
 - f. Strength: 25 times stronger than No. 15 roofing felt and 12 times stronger than No. 30 roofing felt
 - g. Coverage per Roll: 11 percent more coverage per course than traditional No. 15 and No. 30 felt.
 - h. Non-woven walking surface feels like traditional felt underfoot
 - i. Less weight per roll means easier handling during installation.
 - j. Superior lay-flat properties; will not wrinkle or absorb water.
 - k. Sustainability: May contribute to LEED and NGBP ratings.
 - l. Remains flexible and easy to install in cold climates.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- m. Synthetic Construction: 100 percent. Will not rot or mold.
- n. UV exposure rating: 30 day.
- o. Fire Rating: Class A.
- 2. Physical Properties: Results reflect typical properties of control/non-conditioned specimens. Values should not be interpreted as limiting specifications and will vary within typical manufacturing tolerances.
 - a. Code and Standards Compliance:
 - 1) ICC-ES AC188 (ESR-1293).
 - 2) ASTM D226 Type I and II.
 - 3) ASTM D4869.
 - 4) ASTM E108.
 - 5) CSA A 123.3 Type 1 and 2.
 - 6) FBC No. 17873.
 - 7) Permeability ASTM E96: 0.1 U.S. Perms (.0660 Metric Perms).
 - 8) Water Transmission ASTM D4869: Pass.
 - 9) Tear Strength ASTM D4533:
 - a) Machine Direction: 24 lbs (10.88 kg).
 - b) Cross Machine; Transverse Direction: 24 lbs (10.88 kg).
 - 10) Tensile Strength ASTM D751:
 - a) Machine Direction: 80 lbs (36.29 kg).
 - b) Cross Machine; Transverse Direction: 80 lbs (36.29 kg).
 - 11) Burst Strength: 130 psi (896.3 kPa).
 - 12) Elongation: 18 percent.
 - 13) Weight per Square: 1.74 lbs (0.79 kg).
 - 14) Nominal Thickness: 5.9 mils (0.150 mm).
 - b. Temperature Range; Internal: Minus 70 to 212 degrees F (21 to 100 degrees C).
 - 1) Weight per Roll: 17.4 lbs (7.89 kg).
 - c. Coverage per Roll: 1000 sq ft (92.9 sq m).
 - d. Coverage per Roll: 1000 sq ft (92.9 sq m).
 - 1) Roll Dimensions: 40 inches x 300 ft (1016 mm x 91.44 m).
 - a) Rolls per Pallet: 56.
 - 2) Roll Dimensions: 60 inch x 200 ft (1524 mm x 60.96 m).
 - a) Rolls per Pallet: 48.
- B. Basis of Design: Quicksilver Synthetic Roofing Underlayment as manufactured and supplied by System Components Company Incorporated.
 - 1. Features:
 - a. Innovative gasketing technology helps prevent water penetration around fasteners.
 - b. Low shrink construction prevents shrinking and lift at slope transitions and opening around fasteners.
 - c. Superior deck grab improves fastener seal and helps provide a safer walking surface.
 - d. Color: Gray. Provides a comfortable working surface in all temperatures and light conditions.
 - e. Advertise Big and Bold Broadcast Custom Print:
 - 1) To get leads or earn paid advertising revenue during your project.
 - 2) With Broadcast Custom Print your individual logo, phone number, web address and any other advertisements can be featured on rolls, with individual images, up to 3 feet (914 mm) tall and 10 feet (3048 mm) wide.
 - f. Superior walkability with non-woven technology.

- g. Strength: 12 times stronger than traditional roofing felt.
 - h. Won't Buckle, Warp or Crack: Superior lay-flat properties and water resistance prevent wrinkling, wrinkling, and cracking in cold weather.
 - i. Treated to resist excessive degradation from normal UV exposure for up to six months.
 - j. Rated for residential and commercial projects.
 - k. Asphalt Free: 100 percent inorganic and will not rot or mold.
 - l. Sustainable: Environmentally responsible. May contribute to LEED or NGBP ratings.
2. Physical Properties: Results reflect typical properties of control/non-conditioned specimens. Values should not be interpreted as limiting specifications and will vary within typical manufacturing tolerances.
- a. Code and Standards Compliance:
 - 1) ASTM D1970 Type II.
 - 2) CSA A 123.22.
 - 3) FBC No. FL25578.
 - 4) QAI B1040-2.
 - b. Nail Seal, ASTM D1970: Pass.
 - c. Water Transmission ASTM D4869: Pass.
 - d. Tear Strength ASTM, D4533:
 - 1) Machine Direction: 24 lbs (10.88 kg).
 - 2) Cross Machine; Transverse Direction: 25 lbs (11.34 kg).
 - e. Pliability, ASTM D226: Pass.
 - f. Low Temperature Flexibility, ASTM D1970: Pass.
 - g. Nominal Thickness: 13.5 mils (0.343 mm).
 - h. Temperature Rating: Up to 240 degrees F (116 degrees C).
 - i. Weight per Roll: 35 lbs (15.9 kg).
 - j. Coverage per Roll: 1000 sq ft (92.9 sq m).
 - 1) Roll Dimensions: 40 inches x 300 ft (1016 mm x 91.44 m).
 - a) Rolls per Pallet: 25.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 1. Surfaces receiving underlayment to be dry, clean, frost free, dust free, and free of dirt or other foreign matter.
 - 2. Substrates to have no significant delamination, warpage, bowing or separation from the rafters, trusses or support structure.
 - 3. Re-roofing: Remove old materials from roof deck for area to be covered with roof underlayment. Replace water-damaged sheathing and sweep roof deck thoroughly.

- C. Adhesion Test: Determine substrate condition and acceptance by applying a test patch of membrane material to surface and check adhesion according to manufacturer's test procedures.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
- B. Fastening methods and materials should conform to best building practices and local jobsite conditions. Verify final application to be compliant with the requirements of applicable building codes.
- C. Verify compatibility according to geographical region, structure type and roof specification with applicable building codes and/or by review of a building professional.
- D. Follow manufacturer's guidelines for number of days of product exposure to sunlight.

3.4 REPAIRS

- A. Repair damage to the underlayment with caulk or sealant material maintaining a water-tight seal around the damaged area and proper overlaps to run with the flow of water in a shingling fashion. Ensure any incorrectly applied fasteners are caulked and/or sealed to prevent possible moisture ingress.
- B. Apply replacement product in accordance with standard installation procedures. Ensure overlaps run with the flow of water in a shingling fashion and are a minimum of 6 inches (152 mm) in each direction.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.6 CLEANING AND PROTECTION

- A. Clean and protect products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 074113
METAL ROOF PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Roof sheathing.
- B. Section 074213 - Metal Wall Panels

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Manufacturer Qualification Statement: Provide documentation showing metal roof panel fabricator is accredited under IAS AC472.
- F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of five years from Date of Substantial Completion.

- C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Architectural Metal Roof Panels: Snap-Clad manufactured by Pac-Clad.
- B. Other Acceptable Manufacturers; Architectural Metal Roof Panels:
 - 1. ATAS International, Inc; Colonial Seam: www.atas.com/#sle.

2.02 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Steel Panels:
 - a. Zinc-coated steel complying with ASTM A653/A653M; minimum G60 (Z180) galvanizing.
 - b. Steel Thickness: Minimum 24 gauge (0.024 inch) (0.61 mm).
 - 2. Profile: Standing seam, with minimum 1.75 inch (25 mm) seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: Smooth.
 - 4. Width: Maximum panel coverage of 12 inches (406 mm).
 - 5. Slope at 2:12.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 SECONDARY FRAMING

- A. Framing Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.

2.05 FABRICATION

- A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.06 FINISHES

- A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat aluminum coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss to match sample.

2.07 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
 - 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

END OF SECTION

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**SECTION 074213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels, soffit panels, and subgirt framing assembly, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wall panel substrate.
- B. Section 061000 - Rough Carpentry: Water-resistive barrier under wall panels.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Samples: Submit two samples of wall panel and soffit panel, 12 inches by 12 inches (305 mm by 305 mm) in size illustrating finish color, sheen, and texture.
- E. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.06 MOCK-UP

- A. Construct mock-up, 6 feet long by 6 feet wide; include panel and soffit system, glazing, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, related insulation in mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

	07 4213 00 - 1	Metal Wall Panels
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1.08 WARRANTY

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Metal Wall Panels - Concealed Fasteners: Snap-Clad manufactured by Pac-Clad.
- B. Other Acceptable Manufacturers - Metal Wall Panels - Concealed Fasteners:
 - 1. ATAS International, Inc; Multi-Purpose Panels: www.atas.com/#sle.
 - 2. Berridge Manufacturing Company; HC-16 Panel: www.berridge.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 MANUFACTURED METAL PANELS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior wall panels and soffit panels.
 - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 3. Maximum Allowable Deflection of Panel: $L/180$ for length(L) of span.
 - 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 - 7. Corners: Factory-fabricated in one continuous piece with minimum 2 inch (51 mm) returns.
- B. Exterior Wall Panels:
 - 1. Profile: Vertical; style as indicated.
 - 2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
 - 3. Panel Width: 12 inches.
- C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile as indicated in drawings; shop cut and factory mitered to required angles.
- D. Expansion Joints: Same material, thickness and finish as exterior sheets; 24 gauge; manufacturer's standard brake formed type, of profile to suit system.
- E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- F. Anchors: Galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.

3.02 PREPARATION

- A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

3.03 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.

	07 4213 00 - 2	Metal Wall Panels
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Dyersburg, TN

3.04 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch (1.6 mm).

3.05 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.

END OF SECTION

	07 4213 00 - 3	Metal Wall Panels
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**SECTION 076200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, exterior penetrations, and other items indicated in Schedule.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- B. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- C. CDA A4050 - Copper in Architecture - Handbook current edition.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples, 12 by 12 inch in size illustrating material of typical standing seam.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239) inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
 - 1. Color: As selected by Architect from manufacturer's standard colors.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.

	07 6200 00 - 1	Sheet Metal Flashing and Trim
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- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

2.03 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

- A. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.05 SCHEDULE

- A. Through-Wall Flashing in Masonry:
- B. Fascia and Cornices:
- C. Scuppers:
- D. Coping, Cap, Parapet, Sill and Ledge Flashings:

END OF SECTION

	07 6200 00 - 2	Sheet Metal Flashing and Trim
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**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 072500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- B. Section 087100 - Door Hardware: Setting exterior door thresholds in sealant.
- C. Section 093000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.

1.05 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. Pecora Corporation; [____]: www.pecora.com/#sle.
 - 2. Tremco Commercial Sealants & Waterproofing; [____]: www.tremcosealants.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 - 1. Pecora Corporation; [____]: www.pecora.com/#sle.
 - 2. Tremco Commercial Sealants & Waterproofing; [____]: www.tremcosealants.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

	07 9200 00 - 1	Joint Sealant
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2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.

2.03 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
- B. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Color: Match adjacent finished surfaces.
- C. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.
- D. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
1. Color: White.

2.04 SELF-LEVELING SEALANTS

- A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.

	07 9200 00 - 2	Joint Sealant
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Dyersburg, TN

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

	07 9200 00 - 3	Joint Sealant
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FDRP Restroom Facility

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SECTION 081113 HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hollow metal doors and frames
- B. Related Sections:
 - 1. Section 061053 - Miscellaneous Rough Carpentry
 - 2. Section 079200 - Joint Sealants
 - 3. Section 087100 - Door Hardware
 - 4. Section 099000 - Painting and Coating
 - 5. Section 260500 - Common Work Results for Electrical
 - 6. Section 260519 - Low-Voltage Electrical Power Conductors and Cables

1.02 REFERENCE STANDARDS

- A. Organizations:
 - 1. ANSI: American National Standards Institute
 - 2. ASTM: American Society for Testing and Materials
 - 3. BHMA: Builders Hardware Manufacturers' Association
 - 4. DHI: Door and Hardware Institute – Door Security + Safety Professionals
 - 5. HMMA: Hollow Metal Manufacturers Association
 - 6. ITS: Intertek Testing Services
 - 7. NAAMM: National Association of Architectural Metal Manufacturers
 - 8. NFPA: National Fire Protection Agency
 - 9. NOMMA: National Ornamental & Miscellaneous Metals Association
 - 10. SDI: Steel Door Institute
 - 11. UL: Underwriters Laboratories
 - 12. WH: Warnock Hersey International Inc.
- B. Publications:
 - 1. ANSI/BHMA A115 – 2016: Hardware Preparation in Steel Doors and Steel Frames
 - 2. ANSI/SDI A250.3 – 2019: Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames
 - 3. ANSI/SDI A250.4 – 2004: Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, and Frame Anchors
 - 4. ANSI/SDI A250.6 – 2020: Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
 - 5. ANSI/SDI A250.8 – 2023: Specifications for Standard Steel Doors and Frames
 - 6. ANSI/SDI A250.10 – 2020: Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
 - 7. ANSI/SDI A250.11 – 2022: Recommended Erection Instructions for Steel Frames
 - 8. ASTM A568/A568M – 19a: Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements
 - 9. ASTM A653/A653M – 20: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

10. ASTM A879/A879M – 22: Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
11. ASTM A924/A924M – 22: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
12. ASTM A1008/A1008M – 21a: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
13. DHI Installation Guide for Doors and Hardware.
14. DHI Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
15. NAAMM/HMMA 820 TN02 – 03: Continuously Welded Frames
16. NAAMM/HMMA 840 – 17: Guide Specification for Receipt, Storage, and Installation of Hollow Metal Doors and Frames.
17. NFPA 80 – 2022: Standard for Fire Doors and Other Opening Protectives
18. SDI 117 – 2023: Manufacturing Tolerances Standard Steel Doors and Frames
19. SDI 130 – 2019: Electronic Hinge Preparations
20. UL 10B – 2008: Standard for Neutral Pressure Fire Tests of Door Assemblies
21. UL 10C – 2016: Standard for Positive Pressure Fire Tests of Door Assemblies

1.03 SUBMITTALS

- A. Submittals to comply with provisions of Division 01, Submittal Procedures.
- B. Product Data: Manufacturer's standard details and catalog data indicating compliance with referenced standards and manufacturer's installation instructions.
- C. Shop Drawings: Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents. Shop drawings shall include the following information to ensure doors and frames are properly prepared and coordinated to receive hardware:
 1. Elevations of each door and frame type.
 2. Details for door core.
 3. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 4. Locations of cutouts for glass and louvers.
 5. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 6. Mounting locations for hardware.
 7. Thickness of reinforcement/preparations for hardware.
 8. Details of anchorages, joints, field splices, and connections.
 9. Details of accessories.
 10. Details of moldings, removable stops, and glazing.
 11. Fire ratings.
 12. Finish.
- D. Samples: 12 by 12 inches (304 mm by 304 mm) cut away sample of frame welded and prepped for specified hardware. Sample should be furnished with submittals for Owner approval. After approval return sample to door/frame supplier as confirmation of approved construction.
- E. Closeout Submittals to comply with Division 1, Closeout Submittals procedures.
- F. Furnish copies of manufacturer's warranty information and maintenance instructions.

1.04 QUALITY ASSURANCE

- A. Hollow Metal Distributor is to be a direct account of the manufacturer of the products furnished. In addition, that distributor must have in their regular employment an Architectural Hardware Consultant (AHC), Certified Door Consultant (CDC), an Architectural Openings Consultant (AOC), or a Door & Hardware Consultant (DHC) who will be available to consult with the Architect and Contractor regarding any matters affecting the door and frame opening.
- B. Manufacturer Qualifications: Certified Member of the Steel Door Institute in good standing.
- C. Installer: Minimum five years documented experience installing products specified this Section.
- D. Fire Rated Doors and Frames:
 - 1. Underwriters' Laboratories or Intertek Testing Services/Warnock Hersey labeled fire doors and frames:
 - 2. If project requires door assemblies and components that are compliant with positive pressure and S-label requirements, specifications must be cross-referenced and coordinated with hardware and other door manufacturers, especially wood door manufacturers, to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.
 - 3. Provide labeled fire doors and frames in accordance with Underwriters Laboratories standard UL10C Positive Pressure Fire Tests of Door Assemblies.
 - 4. Construct and install doors and frames to comply with current issue of NFPA 80.
 - 5. Manufacture UL or ITS/WH labeled doors and frames in strict compliance with testing agency's procedures and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
 - 6. Affix approved metal label to fire doors and frames, at an authorized facility as evidence of compliance with procedures of the labeling agency.
 - 7. Doors, frames, hardware and their application shall comply or exceed the standards for labeled openings. Prior to fabrication, notify Architect where conflicts regarding fire protection occur.
 - 8. Provide temperature rise fire door assemblies in exit enclosures and exit passageway with maximum transmitted temperature end point rating of not more than 250 degrees F (121 degrees C) above ambient at the end of 30 minutes of the standard fire test exposure.
- E. Coordination:
 - 1. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
 - 2. Coordinate Work with frame opening construction, door and hardware installation.
 - 3. Sequence installation to accommodate required door hardware.
 - 4. Verify field dimensions for factory assembled frames prior to fabrication.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping:
 - 1. The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided to prevent rust or damage.
 - 2. Provide cardboard wrapped or crated product to provide protection during transit and job site storage
 - 3. Should wrappers become wet, remove immediately
- B. Delivery and Site Acceptance:
 - 1. The supplier shall deliver all materials to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Supplier shall coordinate delivery times and schedules with the contractor.

2. Deliver doors cardboard wrapped or crated to provide protection during transit and job site storage. Provide additional protection to prevent damage to any factory-finished doors. Mark all doors and frames with architects opening numbers as shown on the contract documents and shop drawings on the center hinge preparation location.
 3. Upon delivery, check in doors and frames jointly with supplier. Inspect doors and frames upon delivery for damage, correct quantities or shortages. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the architect. Otherwise, remove and replace damaged goods as directed. Note shortages and replace immediately.
- C. Storage and Protection
1. Handle, store and protect products in accordance with the manufacturers printed instructions and the following:
 - a. Comply with ANSI/SDI A250.3, ANSI/SDI A250.8, ANSI/SDI A250.10, and NAAMM/HMMA 840.
 - b. Store all materials in a dry area. All hollow metal material shall be stored so that it does not come in contact with water or moisture. Protect units from adverse weather elements.
 - c. Place units on 4 inch (102 mm) high wood sills to prevent rust and damage.
 - d. Store doors vertically under a properly vented cover, five units maximum in a stack with a 1/4" space between doors to permit air circulation.
 - e. Store frames in an upright position with heads uppermost under cover.
 - f. Store assembled frames five units maximum in a stack with 2-inch (51 mm) space between frames to permit air circulation.

1.06 WARRANTY

- A. Comply with Division 01 Closeout Submittals
- B. All doors and frames shall be warranted in writing by the manufacturer against defects in materials and workmanship for a period of one (1) year commencing on the date of manufacture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all steel doors and frames from a single SDI certified manufacturer:
- B. Basis of Design: MESKER
- C. Other acceptable manufacturers:
 1. Curries
 2. Steelcraft

2.02 GENERAL:

- A. Materials:
 1. Galvanized steel shall be hot dipped zinc coated steel of the alloyed type and comply with ASTM A924 and ASTM A653. The coating weight shall meet or exceed the minimum requirements for coatings having 0.6 oz/ft², (A60 or ZF180).
 2. Physical performance: Units shall comply with the 1 million cycles swing test requirement per ANSI/SDI A250.4 - Level A.
- B. Finishing:
 1. Prime Gray to meet ANSI/SDI A250.10

- C. Electrical Requirements: Coordinate all electrical requirements for doors and frames. Make provisions for installation of electrical items so that wiring can be readily removed and replaced.
 - 1. Coordinate with Section 08 71 00 for electrified hardware items.
 - 2. Provide cutouts and reinforcements required for metal doors and frames to accept electric components.
 - 3. Provide frames with junction boxes at electric hardware preparations.

2.03 DOORS

- A. Provide handed 1-3/4 inches thick Mesker N Series doors complying with ANSI/SDI A250.8 and according to the following:
 - 1. Core: Polyurethane (U)
 - 2. Sheet Thickness: 14 gauge
 - 3. Sheet Material: Zinc-Iron Alloy-Coated galvanized steel A60 (Z)
 - 4. Model: 2, Seamless
 - 5. Top Closure: Factory-sealed continuous channel flush with the top of the door.
 - 6. Bottom Closure: Provide inverted continuous channel.
 - 7. Vertical edges:
 - a. Filled Vertical Edges (S): Continuous vertical mechanical interlocking joints with tack welds every 8 inches. Putty or filler applied to the edge seam and ground smooth.
 - b. Provide hinge and lock door edges beveled 1/8 inch in 2 inches (BV-2) for doors receiving full mortise butt hinges.
- B. Top and bottom closures: Reinforce top and bottom of doors with galvanized 16 gauge minimum, welded to both panels.
- C. Fire Rating: Supply door units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
- D. Faces sheets are to be securely bonded to the core using Moisture Cure Polyurethane Hot Melt adhesion system (HMPUR):
 - 1. Adhesives are to cure completely, meaning once set, they cannot be re-melted and will not soften or freeze and lose adhesion.
 - 2. Adhesive system will have an enhanced resistance to flame spread in its cured state designed to pass UL 10C, Positive Pressure Fire Tests of Door Assemblies.
 - 3. Bonded assemblies will withstand prolonged exposure from -35°F (-37°C) to 200°F (93°C) temperatures without exhibiting any signs of bond failure.
 - 4. Cured adhesive film will remain flexible to allow for differences in thermal expansion and contraction of various substrates without sacrificing bond performance.

2.04 DOOR FRAMES

- A. Provide handed Mesker F series frames for 1-3/4 inches thick doors. Comply with ANSI/SDI A250.8 and the following:
 - 1. Sheet Thickness: 14 gauge
 - 2. Sheet Material: Zinc-Iron Alloy-Coated galvanized steel A60 (Z)
 - 3. Construction: Full Profile Welded
 - 4. Profile: Mesker F Series, Unequal Rabbet (UR)
 - a. Face Size: 2 inches, unless otherwise noted.
 - 1) Provide frames with 4" head face at 7'0" openings in CMU walls.
 - b. Jamb depth: As indicated on Drawings.
 - c. Stops: Standard 5/8-inch-high stops
 - 5. Fire Rating: Supply frame units bearing UL labels for fire ratings indicated in Door Schedule for the locations indicated.

2.05 ACCESSORIES

- A. Anchors: Manufacturer's standard frame anchors, specified in manufacturer's printed installation instructions for project conditions.
- B. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings.
- C. Plaster Guards: Same material as door frame, minimum 24 gauge (0.5 mm) minimum; provide at hardware cutouts and reinforcements .

2.06 FABRICATION

- A. Provide reinforcements and accessories for specified hardware per SDI 250.6.
- B. General:
 - 1. Form metal to sizes and profiles required, with minimum radius for thickness of metal.
 - 2. Hardware Preparations: Comply with ANSI/BHMA A156.115.
 - 3. Hardware Reinforcements: Doors shall be mortised and adequately reinforced per the manufacturers guidelines for all hardware. Required mortise hardware reinforcements shall be drilled and tapped at the factory.
 - a. Comply with the following:
 - 1) Full Mortise Butt Hinges: 7 gauge minimum
 - 2) Continuous Hinges: 14 gauge minimum
 - 3) Lock reinforcements: 16 gauge minimum
 - 4) Surface reinforcements: 14 gauge minimum
 - 5) Other hardware: ANSI/SDI A250.6 and ANSI/SDI A250.8, Table 4
 - b. Additional reinforcements are required for top hinges. Comply with the following:
 - 1) Frame Preparation: Comply with SDI 111-H example A high frequency requirements.
 - 2) Door Preparation: Provide minimum 7 gauge extra long, high frequency top hinge reinforcement.
 - c. Projection welded hinge and lock reinforcements to the edge of the door.
 - d. Provide reinforcements for other hardware as required by the manufacturer.

2.07 FABRICATION:

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
- B. Frames shall be full profile welded in accordance NAAMM/HMMA 820 TN02-03:
 - 1. All elements of the frame member continuously welded; soffits, stops, rabbets, faces and returns. Faces and returns may be welded either internally or externally. Soffits, stops, and rabbets shall be welded internally. Grind, prime paint, and finish smooth face joints with no visible face seams.
- C. Provide temporary steel spreaders welded to the jambs at each rabbet of door openings on welded frames during shipment.
- D. Tolerances shall comply with SDI 117.
- E. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel sheet.
- F. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.

- G. Prepare doors and frames to receive mortised and concealed hardware per final door hardware schedule and templates provided by hardware supplier. Comply with ANSI/BHMA A115 requirements for the indicated door thickness and hardware.
- H. Reinforce doors and frames to receive surface-applied hardware per ANSI/SDI A250.6. Provide internal reinforcements for all doors to receive door closers and exit devices where scheduled.
- I. Locate hardware as indicated on Drawings and in accordance with DHI Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
- J. Fabricate doors with 3/8 inch undercut where openings receive bumper seal threshold.

2.08 FINISHES

- A. Chemical Treatment: Treat steel surfaces to promote paint adhesion.
- B. Exposed door and frame surfaces to be cleaned and treated then coated with rust inhibitive primer. Water-based primer and color paint finishes to be free of Hazardous Air Pollutants (HAPS) and Volatile Organic Compounds (VOCs). Paint to comply with ANSI/SDI A250.3 and ANSI/SDI A250.10.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Confirm the following is correct and complete prior to installation:
 - 1. Project conditions are acceptable before beginning installation of frames.
 - 2. Substrates, areas, and conditions comply with requirements for installation tolerances.
 - 3. Rough openings for frames at existing walls and wood stud walls are correctly sized.
 - 4. Frames are the correct size, rating, and prepared and reinforced for the indicated application.
 - 5. Verify that completed concrete or masonry openings to receive butt type frames are of correct size.
 - 6. Conduit has been run to the openings receiving electric hardware.
- B. Submit list of deficiencies.
- C. Correct unacceptable conditions before proceeding with installation.

3.02 INSTALLATION

- A. General:
 - 1. Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
 - 2. Fire Doors and Frames: Install in accordance with SDI A250.11 and NFPA 80.
- B. Hollow Metal Frames:
 - 1. Comply with provisions of ANSI/SDI A250.11. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 - 2. Prepare frames prior to installation as follows:
 - a. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
 - b. Adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1) Squareness: $\pm 1/16$ inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

- 2) Alignment: $\pm 1/16$ inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3) Twist: $\pm 1/16$ inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4) Plumbness: $\pm 1/16$ inch, measured at jambs on a perpendicular line from head to floor.
3. Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NAAMM/HMMA 840.
 4. Brace frames securely until permanent anchors are set. After frame installation and wall construction are complete, remove temporary braces, leaving surfaces smooth and undamaged.
- C. Grouting Hollow Metal Frames:
1. Provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting. Apply the strip to the back of the frame to facilitate field drilling or tapping.
 2. Shield hardware fastener holes, preparations, and reinforcements from contact with grout.
 3. Apply bituminous undercoating to backs of frames that are filled with grout containing antifreezing agents.
 4. Install temporary bottom and intermediate wood spreaders to maintain proper width and avoid bowing or deforming of frame members in compliance with ANSI/SDI A250.11 and NAAMM/HMMA 840.
 5. Comply with ANSI/SDI A250.8, paragraph 4.2.2, and HMMA 820 TN01 Grouting Hollow Metal Frames, whereby grout will be mixed to provide a 4 inch (102 mm) maximum slump consistency and hand troweled into place. Do not use grout mixed to a thinner consistency.
 6. Provide a vertical wood brace during grouting of frame at openings over 4 foot (1219 mm) wide, to prevent sagging of frame header.
- D. Except for frames located in existing walls, place frames before constructing enclosing walls and ceilings.
1. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws. Secure Sill Anchors to floor. Use additional anchors as required for height per manufacturers' installation instructions.
 2. In masonry construction, install at least 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 T-shaped anchors. Use additional anchors as required for height per manufacturers' installation instructions.
- E. At existing concrete or masonry construction, install at least 4 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to walls with bolts and masonry anchorage devices. Use additional anchors as required for height per manufacturers' installation instructions.
- F. Fastener Requirements:
1. Refer to the approved drawings for the anchor layout and notes.
 2. Refer to the approved drawings for the minimum embedment depths for the fasteners and the minimum edge distances (minimum distance fastener must be from the edge of the substrate material) for the fasteners.
- G. Install silencers.
1. Where frames are to be grout filled and receive silencers, install silencers prior to frame installation.

- H. Hollow Metal Doors:
 - 1. Fit hollow-metal doors accurately in frames, within clearances specified in SDI A 250.11 and SDI 100.
 - 2. Install hardware in accordance with hardware manufacturers' instructions and Section 087100. Install hardware with only factory-provided fasteners.
 - 3. Install fire rated doors with clearances specified in NFPA 80.
 - 4. Adjust door installation to provide 1/8" at head and 1/8" at strike and hinge jamb with door undercut to meet fire ratings and floor conditions to achieve maximum operational effectiveness and appearance.

3.03 FIELD QUALITY CONTROL

- A. Ensure compliance with Positive Pressure criteria as required by UBC7-2, UL10C, NFPA5000 and all applicable Local, State and National Code Jurisdictions.
- B. Fire-Rated Door Assembly Testing:
 - 1. Upon completion of the installation, test each fire door assembly to confirm proper operation of its closing device and verify that it meets all criteria of a fire door assembly per NFPA 80.
 - 2. Perform inspections by individuals with documented knowledge and understanding of the operation components of the type of door being tested per NFPA 80 and NFPA 101.
 - 3. Provide a written record to the Owner with copies available to the Authorities Having Jurisdiction (AHJ).
 - 4. Record shall list the fire door assembly and include the door number with an itemized list of hardware set components for each door opening and location in the facility.

3.04 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.
- C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- D. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer, rust-inhibitive primer.
- E. Properly clean and apply paint to doors and frames in accordance with HMMA-840 TN01 and ANSI/SDI A250.8 appendix B along with the manufacturers recommended surface preparation for painting.

3.05 PROTECTION

- A. Protect installed products and finished surfaces from damage during construction.

END OF SECTION 081113

**SECTION 087100
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow metal doors.
- B. Electrically operated and controlled hardware.
- C. Thresholds.
- D. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealants for setting exterior door thresholds.
- B. Section 081113 - Hollow Metal Doors and Frames.
- C. Section 260500 - Common Work Results for Electrical
- D. Section 260519 - Low-Voltage Electrical Power Conductors and Cables

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. BHMA A156.1 - Standard for Butts and Hinges 2021.
- C. BHMA A156.4 - Door Controls - Closers 2019.
- D. BHMA A156.7 - Template Hinge Dimensions 2016.
- E. BHMA A156.8 - Door Controls - Overhead Stops and Holders 2021.
- F. BHMA A156.13 - Mortise Locks & Latches Series 1000 2022.
- G. BHMA A156.16 - Auxiliary Hardware 2018.
- H. BHMA A156.18 - Materials and Finishes 2020.
- I. BHMA A156.21 - Thresholds 2019.
- J. BHMA A156.22 - Standard for Gasketing 2021.
- K. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems 2018.
- L. BHMA A156.31 - Electric Strikes and Frame Mounted Actuators 2019.
- M. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- N. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.
- O. DHI (KSN) - Keying Systems and Nomenclature 2019.
- P. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.
- Q. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- R. ITS (DIR) - Directory of Listed Products Current Edition.
- S. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- U. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- V. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- W. UL (DIR) - Online Certifications Directory Current Edition.

- X. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- Y. UL 294 - Access Control System Units Current Edition, Including All Revisions.
- Z. UL 1034 - Standard for Safety Burglary-Resistant Electrical Locking Mechanisms Current Edition, Including All Revisions.
- AA. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.
- C. Preinstallation Meeting: Convene a preinstallation meeting no later than one week prior to commencing work of this section; request attendance of the following:
 - 1. Architect.
 - 2. Installer's Architectural Hardware Consultant (AHC).
 - 3. Hardware Installer.
 - 4. Owner's Security Consultant.
 - 5. Electrical sub-contractor.
- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying and Programming Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Requested:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Installer's Architectural Hardware Consultant (AHC).
 - e. Door Hardware Installer.
 - 3. Agenda:
 - a. Establish keying requirements.
 - b. Ascertain existing keying system expansion details.
 - c. Verify locksets and locking hardware are functionally correct for project requirements.
 - d. Verify that keying and programming complies with project requirements.
 - e. Establish keying submittal schedule and update requirements.
 - f. Review electronic locking and programming schedule.
 - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.
 - c. Schematic diagram of preliminary key system.
 - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
 - 6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
 - 1. Prepared by an Architectural Hardware Consultant (AHC).
 - 2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
 - a. Submit in vertical format.
 - 3. List groups and suffixes in proper sequence.
 - 4. Include complete description for each door listed.
 - 5. Include manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings for Electrified Door Hardware:
 - 1. Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Furnish elevations and diagrams prepared by an Electrified Hardware Consultant (EHC) for each electrified door opening as follows:
 - a. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 - b. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.
- E. Samples for Verification:
 - 1. Submit complete hardware samples later than three weeks after receipt of approved Door Hardware Schedule as follows:
 - a. Hardware items required for door# 100:
 - 1) 1ea Hinge
 - 2) 1ea Lockset Kit
 - 3) 1ea Closer
 - 4) 1ea 12" length of weatherstrip for head soffit.
 - 2. Approved samples will be turned over to the Owner at Final Completion.
 - 3. Include product description with samples.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Installer's qualification statement.
- H. Supplier's qualification statement.
- I. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 - 1. Include manufacturer's parts lists and templates.
- J. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying and Programming Meeting.
- K. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- L. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
 - 1. Closers: Five years, minimum.
 - 2. Locksets and Cylinders: Three years, minimum.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Locks: Provide a lock for each door, unless it's indicated that locking is not required.
 - 1. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's Series. As indicated in hardware sets.
 - 2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
 - 3. Strikes:
 - a. Finish: To match lock or latch.
 - b. Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.
 - c. Center Strike at Pairs of Doors: 7/8 inch (22.2 mm) lip.
- D. Closers:
 - 1. Provide surface door closers on exterior doors.
 - 2. Provide surface door closers on fire-rated doors and smoke-rated doors.
- E. Overhead Stops and Holders:
 - 1. Provide a concealed-mounted stop for swinging doors.
 - 2. Omit overhead stops from doors where one of the following are required:
 - a. IS series stop-arm assembly
 - b. DS series stop-arm assembly
 - c. Wall stop
- F. Thresholds:
 - 1. Provide when specified at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
 - 2. Provide at exterior doors.

- G. Weatherstripping and Gasketing:
 - 1. Provide weatherstripping for exterior door frame heads and jambs. Size of weatherstrip lengths are to match the corresponding frame heads and jambs lengths.
 - 2. Fabricate as continuous gasketing lengths.
- H. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
- I. See Section 281000 for additional access control system requirements.
- J. Antimicrobial Coating (AM): Provide locksets with manufacturer's standard silver-based coating that inhibits the growth of fungus, mold, mildew and bacteria.
- K. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - 2. Fasteners shall finished to match corresponding door hardware.
 - 3. Screw Drives:
 - a. Provide fasteners with Phillips drive unless otherwise indicated.
 - b. Provide tamper resistant fasteners 6-lobe, Torx, and Spanner for hardware at restroom doors.
 - 4. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - 5. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
 - 6. Provide wall grip inserts for hollow wall construction.
 - 7. Fire-Resistance-Rated Applications: Comply with NFPA 80.
 - 8. Provide machine screws for hinges, strikes, and closers at metal frames and metal doors.

2.02 PERFORMANCE REQUIREMENTS

- A. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ICC A117.1.
 - 3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR) or ITS (DIR) as suitable for application indicated.
 - 5. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 - 6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 - 7. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

- A. Manufacturers: Conventional butt hinges.
 - 1. BEST; dormakaba Group: www.bestaccess.com/#sle.
- B. Properties:
 - 1. Butt Hinges: As applicable to each item specified.
 - a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
 - b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.

- c. Template screw hole locations.
 - d. Bearing assembly installed after plating.
 - e. Bearings: Concealed fully hardened bearings.
 - f. Bearing Shells: Shapes consistent with barrels.
 - g. Pins: Easily seated, non-rising pins.
 - 1) Fully plate hinge pins.
 - 2) Non-Removable Pins (NRP): Slotted stainless steel screws.
 - h. UL 10C listed for fire-resistance-rated doors.
- C. Finishes: Weatherized Satin Stainless Steel.
- 1. Fully polish hinges; front, back, and barrel.
- D. Grades:
- 1. Provide hinges meeting the following requirements:
 - a. BHMA A156.1 and BHMA A156.7 for templated hinges.
 - b. BHMA A156.18 Materials and Finishes.
 - c. BHMA A156.1 Salt Spray Test.
 - d. UL 294 Corrosion Test Outside Moist Hydrogen sulfide (H₂) air mixture.
 - e. UL 294 Corrosion Test Outside Moist Carbon Dioxide (CO₂) sulfur dioxide (SO₂) air mixture.
 - f. UL 294 Corrosion Test Outside Salt Spray.
- E. Types:
- 1. Butt Hinges: Include full mortise hinges.
- F. Options: As applicable to each item specified.
- G. Quantities and Size:
- 1. Butt Hinges: Three (3) hinges per leaves up to 90 inches (2286 mm) in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.
 - a. Hinge weight and size unless otherwise indicated in hardware sets:
 - 1) For doors up to 36 inches (914 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.134 inch (3.4 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - 2) For doors from 36 inches (914 mm) wide up to 42 inches (1067 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.145 inch (3.7 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - 3) For doors from 42 inches (1067 mm) wide up to 48 inches (1219 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
 - 4) For doors greater than 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
 - b. Hinge Width:
 - 1) 4 1/2" minimum for 1 3/4" thick doors.
 - 2) Sufficient size to allow 180 degree door swing.
- H. Applications:
- 1. Provide butt hinges at swinging doors.
 - 2. Provide NRP hinges at restroom doors.
- I. Products:
- 1. Butt Hinges concealed bearing, five (5) knuckle:
 - a. BEST CB Series.

2.04 ELECTRIC STRIKES

- A. Manufacturers:

1. RCI; dormakaba Group: www.dormakaba.com/us-en/#sle.
- B. Properties:
 1. Provide UL 1034 compliant devices.
 2. Non-handed devices suitable for door frame material and scheduled lock configuration.
 3. Fail Mode: Fail Safe.
 4. Holding Force: 1,500 lbs (680.4 kg).
 5. Accommodating latch projections of 3/4 inch (19 mm).
 6. Horizontal adjustment up to 1/8 inch (3.2 mm).
- C. Grades: Complying with BHMA A156.31, Grade 1.
- D. Options: As applicable to each item specified.
 1. Voltage: 24 VDC.
 2. Provide adjustable dead bolt keeper and deadlatch ramp.
 3. Provide in-line power controller for fail safe electric strikes.
- E. Products:
 1. Electric Strike: RCI Model# 2364.
 2. In-line Power Controller: RCI Model# ICEPK

2.05 LOCK CYLINDERS

- A. Manufacturers:
 1. BEST, dormakaba Group: www.bestaccess.com/#sle.
- B. Properties:
 1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 - a. Provide cylinders from same manufacturer as locking device.
 - b. Provide cams and/or tailpieces as required for locking devices.
 - c. Provide cylinders compatible with permanent cores.
- C. Grades:
- D. Types: As applicable to each item specified.
 1. Small format interchangeable core (SFIC) type cylinders, with seven-pin cores.
- E. Products: BEST E Series x PATD Cormax

2.06 MORTISE LOCKS

- A. Manufacturers:
 1. BEST, dormakaba Group: www.bestaccess.com/#sle.
- B. Properties:
 1. Mechanical Locks: Manufacturer's standard.
 - a. Fitting modified ANSI A115.1 door preparation.
 - b. Door Thickness Coordination Fitting 1-3/4 inch (44 mm) to 2-1/4 inch (57 mm) thick doors.
 - c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
 - 1) Latchbolt Throw: 3/4 inch (19 mm), minimum.
 - d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
 - e. Backset: 2-3/4 inch (70 mm).
 - f. Cylinders:
 - 1) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
 - (a) 7-pin, removable.
 - (b) Small format interchangeable.
 - g. Lever Trim:

- 1) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - 2) Spindle: Designed to prevent forced entry from attacking of lever.
 - 3) Independent spring mechanism for each lever.
 - (a) Trim to be self-aligning and thru-bolted.
 - 4) Handles: Made of forged or cast brass, bronze, or stainless steel construction.
 - 5) Levers to operate a roller bearing spindle hub mechanism.
 - 6) Outside Tactile Lever Handles (TAC/O): Provide outside lever with machined grooves into the back of the hand grasp portion where specified in the hardware sets.
- C. Finishes: See Door Hardware Schedule.
1. Core Faces: Match finish of lockset.
- D. Grades:
1. Comply with BHMA A156.13, Grade 1.
- E. Products: Mortise locks:
1. BEST 40H Series.

2.07 CLOSERS

- A. Manufacturers:
1. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
- B. Properties:
1. Provide surface mounted, corrosion resistant closers conforming to the following:
 - a. Construction: Aluminum alloy bodies with high compression rings and hardened piston racks.
 - b. Maximum Projection from Face of Door: 2-1/8 inches (54 mm).
 - c. Mechanism:
 - 1) Separate tamper-resistant adjusting valves for closing and latching speeds.
 - 2) Include separate valves for adjusting backcheck and backcheck positioning.
 - d. Hydraulic Fluid: All-weather type.
 - e. Arm Assembly: Standard for product specified.
 - 1) Include integral stop or spring-loaded stop feature, as specified in Door Hardware Schedule.
 - 2) Parallel arms to be heavy-duty rigid type.
 - 3) Where IS and S-IS arms are specified in hardware sets, if manufacturer does not offer these arm assemblies provide a regular arm mount closer in conjunction with a heavy-duty overhead stop.
 - f. Covers:
 - 1) Type: Standard for product selected.
 - (a) Full.
 - 2) Material: Plastic.
 - 3) Finish: Painted.
- C. Grades:
1. Closers: Comply with BHMA A156.4, Grade 1.
 - a. Underwriters Laboratories Compliance:
 - 1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
- D. Code Compliance: As required by AHJ.
- E. Types:
1. Rack-and-pinion, surface-mounted.

- F. Installation:
 - 1. Surface mount closers as follows:
 - a. Mount closers on non-public side of door.
 - b. Stair-side of stair doors.
 - c. Mount closers on interior side of exterior doors.
 - d. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
 - e. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.
- G. Products:
 - 1. Surface Mounted:
 - a. Dormakaba:

2.08 OVERHEAD STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Architectural Builders Hardware Mfg (ABH): www.abhmfg.com/#sle.
- B. Properties:
- C. Sizes: Manufacturer's standard for the application.
- D. Finishes:
 - 1. Arms and Brackets: Stainless Steel.
- E. Grades: As applicable to item specified.
 - 1. Comply with BHMA A156.8, Grade 1.
- F. Material: All stainless steel components (N)
- G. Types:
 - 1. Concealed.
- H. Products:
 - 1. Concealed Overhead Stops and Holders:
 - a. ABH: N 1020 SEC Series.

2.09 STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Trimco: www.trimcohardware.com/#sle.
- B. Grades:
 - 1. Wall Bumpers: Comply with BHMA A156.16 and Resilient Material Retention Test requirements.
- C. Material: Base metal as indicated for each item by BHMA material and finish designation.
- D. Types:
 - 1. Wall Bumpers: Bumper, convex, wall stop.
- E. Products:
 - 1. Wall Bumpers: Trimco model# 1270WX.

2.10 THRESHOLDS

- A. Manufacturers:
 - 1. National Guard Products, Inc: www.ngpinc.com/#sle.
- B. Properties:
 - 1. Threshold Surface: Fluted horizontal grooves across full width.
 - 2. Size:
 - a. Width: 5 inches

- b. Height: 1/2 inch maximum
- c. Length: Match corresponding frame opening width.
- C. Grades: Thresholds: Comply with BHMA A156.21.
- D. Material: Aluminum
- E. Types: Provide barrier-free type.
 - 1. Bumper Seal Thresholds with Gasket: Use silicone gaskets.
- F. Products:
 - 1. NGP, Inc model# 896ADJ S.

2.11 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
 - 1. National Guard Products, Inc: www.ngpinc.com/#sle.
- B. Size: Match corresponding frame head and jamb lengths.
 - 1. Adhesive-Backed Perimeter Gasketing: Silicone gasket material applied to frame with self-adhesive.
 - 2. Rigid, Housed, Perimeter Gasketing: Silicone gasket material held in place by aluminum housing; fastened to frame stop with screws.
- C. Grades: Comply with BHMA A156.22.
- D. Products:
 - 1. Weatherstripping: NGP #172 S Series.
 - 2. Adhesive Gasketing: NPG #2525 Series.

2.12 MISCELLANEOUS ITEMS

- A. Manufacturers:
 - 1. Trimco: www.trimcohardware.com/#sle.
- B. Properties:
 - 1. Silencers: Provide hollow metal door frames with silencers to mute sound of door's impact upon closing. Omit silencers where weatherstripping and gasketing are required.
 - a. Single Door: Provide three on strike jamb of frame.
 - b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 - c. Material: Rubber, gray color.
- C. Products:
 - 1. Silencers: Trimco #1229A.

2.13 ELECTRIFIED HARDWARE

- A. Manufacturers:
 - 1. BEST, dormakaba Group: www.bestaccess.com/#sle.
 - 2. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
 - 3. RCI; dormakaba Group: www.dormakaba.com/us-en/#sle.
 - 4. ABH.
- B. Properties:
 - 1. Day Timer:
 - a. Provide a programmable relays for scheduled locking of restroom doors. Day timers shall include and comply with the following:
 - 1) Power input compatible with 24VDC
 - 2) 24 hour, 365 day timer for individual daily events
 - 3) 2 momentary or latching SPDT relays to control electric lock devices
 - 4) 40 holidays and 99 user events
 - 5) Large alpha-numeric backlit LCD display for easy programming

- 6) EEPROM memory for safe storage of data
2. Door Controller:
 - a. Provide a door controller to receive signal from day timer for locking and unlocking electric strikes. Door controller shall include and comply with the following:
 - 1) Power input compatible with 24VDC
 - 2) 6 1A @ 24VDC SPDT relay outputs
 - 3) 6-Zone control interface.
 - 4) Pre-programmed functions.
 - 5) 3-digit 8-segment LED display
 3. Power Supply Units: Manufacturer's standard.
 - a. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
 - b. Power: 24VDC, 6A.
 - 1) Incoming Power Voltage: 120 VAC.
 - c. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.
 - d. Auxiliary contacts for remote signaling.
 - e. User-selectable time delay from 0 to 4 minutes.
 - f. Fire Alarm System Interface: Standard.
 - g. Output Distribution Board with indicator LEDs.
 - h. Battery-backup ready with no additional boards.
 - 1) Built-in dedicated charger.
 - 2) Battery load and charge test every 48 hours.
 - 3) Battery reversal protection.
 - 4) Red LED: Low-battery indication.
 - 5) Provide 24VDC 7AH batteries.
 - i. On/Off LED power indicator.
 4. Wire Harnesses:
 - a. Provide electric strikes with two wire harnesses complying with the following:
 - 1) Length:
 - (a) Harness for electric strike: 362 inches
 - (b) Harness for junction box or power supply cabinet: 6 inches
 - 2) Provide harnesses with pinned conductors on both ends and compatible quick connectors for both ends.
 - 3) Conductors: Harness shall contain twelve conductors as follows:
 - (a) Two 18 American Wire Gage conductors for power to electric strikes
 - (b) Ten 10/22AWG conductors for signaling functions.
 - 4) Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.
 - b. Additional Materials: Furnish one complete wire harness kit and one crimping tool.
- C. Products:
 1. Day Timers: RCI# TD365
 2. Door Controllers: RCI# IL06
 3. Power Supplies: RCI# DKPS-6A
 4. Batteries: RCI# BB24-7
 5. Wire Harnesses: ABH EZDK Series
 - a.

2.14 KEYS AND CORES

- A. Manufacturers:
 1. BEST, dormakaba Group: www.bestaccess.com/#sle.
- B. Construction Cores:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Cores:
 - a. Provide locksets and cylinders with seven-pin SFIC cores for use during construction in accordance with the following:
 - 1) Keyway: A
 - 2) Keying: Keyed-alike
 - 3) Finish: Painted Green
 2. Keys:
 - a. Furnish keys according to type in following quantities:
 - 1) Operating Keys: 10 each
 - 2) Control Keys: 2 each
- C. Permanent Cores: BHMA A156.28 requirements.
1. Construction cores shall be replaced with master-keyed at Final Completion. Provide seven pin cores complying with the following:
 - a. Provide small format interchangeable cores.
 - b. Provide Patented CORMAX keys and cores.
 - c. Provide keying information in compliance with DHI (KSN) standards.
 - d. Keying: Comply with Owner-approved key schedule.
 - e. Key to existing keying system as directed by Owner.
 2. Furnish keys in following quantities:
 - a. Top Master Keys: 1 each.
 - b. Master Keys: 4 each.
 - c. Control Keys if New System: 2 each.
 - d. Change Keys: 2 each for each keyed core.
 - e. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
 - f. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
 - g. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
- D. Products:
1. Construction Cores: BEST 1CC7A2
 2. Permanent Cores: BEST Patented CORMAX series

2.15 FINISHES

- A. Finishes:
 1. Identified in Hardware Sets.
 2. Comply with BHMA A156.18 requirements.
- B. Finish: 630; satin stainless steel, with stainless steel 3000 series base material (former US equivalent 32D), 652; satin chromium plated over nickel, with steel base material (former US equivalent 26D), and 689; aluminum painted, with any base material (former US equivalent US28); BHMA A156.18.
- C. Exceptions:
 1. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 2. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
 3. Aluminum Surface Trim and Gasket Housings: Anodized to match door panel finish, not other hardware, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Correct all defects prior to proceeding with installation.
- C. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- D. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- E. Use templates provided by hardware item manufacturer.
- F. Do not install surface mounted items until application of finishes to substrate are fully completed.
- G. Wash down masonry walls and complete painting or staining of doors and frames.
- H. Complete finish flooring prior to installation of thresholds.
- I. Door Hardware Mounting Heights:
 - 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 - 2. Strikes: 40-5/16 inches from finished floor to center line.
- J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
 - 1. See Section 079200 for additional requirements.
- K. Power electric strikes, day timers, and door controllers with 24VDC.
- L. Set door controller to Function# 7.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.
- B. Enlist services of an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation activities.
- C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

3.07 SCHEDULES

- A. Manufacturers
 - 1. ABH Manufacturing Inc. (AB)
 - 2. Best Access Systems (BE)
 - 3. Dorma Door Controls (DM)
 - 4. National Guard (NA)
 - 5. RCI (RC)
 - 6. BEST Hinges and Sliding (ST)
 - 7. Trimco (TR)
- B. Finishes
 - 1. 630 Satin Stainless Steel
 - 2. 630AM Satin Stainless - Antimicrobial Coating
 - 3. 630W Stainless Steel, Weatherized
 - 4. 689 Aluminum Painted
 - 5. 719 Mill Finish Aluminum
 - 6. GREY Grey Rubber
- C. Hardware Sets

Set #1

Doors: 100, 101, 102, 103, 105, 106

3 Hinge	CB199 4.5" x 4.5" NRP TORX SCREWS	630W	ST
1 Lockset with Indicators	45H-7H15H PATD SH VIB	630AM	BE
1 Construction Core	1CC7A2		BE
1 Electric Strike	2364	630	RC
1 Closer	STA 8916 AR BP89 TX89	689	DM
1 Overhead Stop	N 1020 SEC Series	630	AB
	NOTE: Template for 90° deadstop.		
1 Wire Harness	EZDK-362		AB
1 Wire Harness	EZDK-6-X		AB
1 In-Line Power Controller	ICEPK		RC
1 Set Weatherstrip	172 S TORX SCREWS		NA
1 Threshold	896ADJ S SPANNER 10-24 SSMS/LA	719	NA

NOTE:

During open-hours, door is closed and electric strike is released. Access can be gained by pushing door. Outside of door can be locked by inside thumbturn at which time access can be gained by emergency key at outside cylinder.

During out-of-service-hours, door is closed and electric strike is secure. Access can be gained with valid key at outside cylinder. Outside remains locked when key is removed.

AC power failure triggers automatic switch over to battery power.

Upon total loss of power the electric strike releases.

Free egress at all times by inside lever.

Electric strike is controlled by day timer and electronic controller located in ELEC. 104.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

Set #2

Doors: 104

3 Hinges	CB199 4.5" x 4.5"	630W	ST
1 Storeroom Lockset	45H-7D15H PATD S5 TAC/O	630AM	BE
1 Closer	STA 8916 AR	689	DM
1 Wall Bumper	1270WX	630	TR
1 Set Weatherstrip	172 S TORX SCREWS		NA
1 Threshold	896ADJ S 10-24 SSMS/LA	719	NA

Set #3

Doors: 107

3 Hinges	CB199 4.5" x 4.5"	630W	ST
1 Storeroom Lockset	45H-7D15H PATD	630AM	BE
1 Wall Bumper	1270WX	630	TR
1 Threshold	896ADJ S 10-24 SSMS/LA	719	NA
3 Silencer	1229A	GREY	TR

Set #4

ADDITIONAL MATERIALS

1 Sample: Hinge	CB199 4.5" x 4.5" NRP TORX SCREWS	630W	ST
1 Sample: Lockset with Indicators	45H-7H15H STD SH VIB	630AM	BE
1 Sample: Closer	STA 8916 AR BP89 TX89	689	DM
1 Sample: Length Weatherstrip	172 SA 12"		NA
2 Construction Control Key	7147449		BE
10 Construction Core Key	7148872		BE
1 Wire Harness Kit	EZDK-KIT		AB
1 Hand Crimp Tool	EZDK-MHCT		AB
1 Day Timer	TD365		RC
2 Battery Backup	BB24-7		RC
1 Power Supply	DKPS-6A		RC
1 Electronic Controller	ILO6		RC

END OF SECTION

**SECTION 09900
PAINTING**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the Drawings, or reasonably implied to complete the construction.
- B. Extent of painting work is indicated on drawings, and as herein specified.

1.02 Related Work:

- A. Shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, and hollow metal frames.
- B. Shop priming of fabricated components is included under various sections for architectural woodwork, mechanical equipment, and electrical accessories.

1.03 System Description:

- A. "Paint" as used herein means all coating system materials including primers, emulsions, enamels, stains, sealers, fillers, and other applied materials whether used as a prime, intermediate, or finish coat.

1.04 Quality Assurance:

- A. Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
- C. Do not paint over any code required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.05 Submittals:

- A. Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use, as well as color, texture, and finish charts.
- B. Prior to beginning work, Architect will select colors, textures, and finishes for surfaces to be painted. Submit samples for Architect's review, including a description of material and application for each coat of each sample.
 - 1. Provide two 4 inch square samples for each type of filler, prime, finish coat, and color as applicable.

1.06 Delivery, Storage and Handling:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- A. Deliver materials to job site in new, original, unopened packages and containers bearing following information:
 - 1. Manufacturer's name, stock number, and date of manufacture.
 - 2. Material, color name and number, and Federal Specification Number as applicable.
 - 3. Contents by volume, for major pigment and vehicle constituents.
 - 4. Thinning and application instructions.
 - B. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue. Maintain storage area in orderly condition and remove oily rags and waste daily. Protect storage area from freezing.
 - 1. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.
- 1.07 Project Conditions:
- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C), unless otherwise permitted by paint manufacturer's printed instructions.
 - B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C), unless otherwise permitted by paint manufacturer's printed instructions.
 - C. Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
 - 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.
 - 2. Do not apply finish in areas where dust is being generated.
 - D. In warm weather, apply concrete stain in early morning when concrete is coolest.

PART 2: PRODUCTS

- 2.01 Acceptable Manufacturers:
- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following, unless otherwise indicated:
 - 1. Farrell Calhoun Paints
 - 2. Sherwin Williams Company

2.02 Materials:

- A. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
 - 1. Proprietary names used to designate colors or materials are not intended to imply that products of other manufacturers are excluded.
 - 2. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.
 - 3. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance for any proposed substitutions.
- B. Color pigments shall be pure and non-fading, applicable to materials to be covered.

PART 3: EXECUTION

3.01 Inspection:

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed 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 film.

3.02 Preparation:

- A. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Following completion of painting of each space or area, reinstall removed items.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- B. Ferrous Metals - 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.
1. Touch-up shop applied prime coats wherever damaged or bare, as required by other sections of these specifications.
 2. Clean and touch-up with same type shop primer.
- C. Galvanized Surfaces - Clean free of oil and surface contaminants with non-petroleum based solvent.
- D. Wood - Clean wood surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 2. When transparent finish is required, use spar varnish for backpriming.
 3. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
 4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- E. Concrete - Prepare cementitious surfaces of concrete, concrete block, and cement plaster by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
1. 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.
 2. 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.
- F. Paints:
1. Mix and prepare painting materials in accordance with manufacturer's directions.

2. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 3. 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.
- G. Previously Painted Surfaces:
1. Test existing coatings to determine if the coating is water-based or oil-based. Existing alkyd coatings specified to receive a latex topcoat should be primed with an enamel undercoater. Scuff sand aged alkyd coatings to ensure proper adhesion.
- 3.03 Surfaces to be Painted:
- A. Paint all exposed surfaces except where specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will make selections from full range of manufacturer's colors or finishes.
1. Pre-Finished Items - Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for items.
 2. Concealed Surfaces - Unless otherwise indicated, painting is not required for concealed walls or ceilings, inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
 3. Finished Metal Surfaces - Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
 4. Operating Parts - Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
- 3.04 Application:
- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
 2. Provide finish coats which are compatible with prime paints used.
 3. 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 ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. 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.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 7. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
 8. Sand lightly between each succeeding enamel or varnish coat.
- B. Prime Coat - 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.
- C. First Coat - 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.
- D. Minimum Coating Thickness - Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- E. Mechanical and Electrical Work - Painting of mechanical and electrical work is limited to those items exposed in occupied spaces and includes, but is not limited to, field painting of the following:
1. Exposed bare and covered pipes, ducts, and hangers.
 2. Exposed steel and iron work.
 3. Primed metal surfaces of equipment.
 4. Roof top HVAC equipment.
- F. 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.
- G. 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 surface imperfections.
1. Provide satin finish for final coats, unless otherwise indicated.
- H. Concrete Stain shall be applied in accordance with manufacturer's instructions and as follows:

1. Apply evenly and continuously over surface, but do not puddle the stain. If puddling should occur do not attempt to correct it.
 2. When first application of stain is dry, apply second application in same manner as first.
 3. When applying second application, if color shows considerably lighter on certain areas when wet with stain, apply additional stain to light area. Do not attempt to correct any puddles that may occur.
 4. After second application of stain is dry, apply chemical hardener in accordance with manufacturer's instructions and as follows:
 - a. Keep the entire surface wet for a minimum of 30 minutes.
 - b. As the surface becomes slippery, lightly mist the surface with water causing the material to lose its slipperiness.
 - c. As the surface again becomes slippery, thoroughly flush the entire surface with water and squeegee the surface completely dry to remove all surface alkali or chemical hardener residue.
- I. Completed Work - Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.05 Cleaning:

- A. At end of each work day, remove discarded paint materials, rubbish, cans and rags from project site.
- 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. Upon completion of concrete staining the powdery residue formed from the reaction of stain on concrete must be removed after final application of stain is dry. Flush area with water, scrub with a stiff brush, then remove water by appropriate method.
 1. Do not use soap, detergents, or other cleaning product.
 2. Rinse water may be slightly corrosive and have the capacity to stain. Use special care to avoid spattering of adjacent work.

3.06 Protection:

- A. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
 1. Provide "Wet Paint" signs as required to protect newly-painted finishes. After completion of painting operations, remove temporary protective wrappings provided by others for protection of their work.

2. At completion of work of other trades, touch-up and restore all damaged or defaced surfaces.

3.07 Exterior Paint Schedule:

A. Ferrous Metal: Doors.

1. Prime Coat - Rust inhibitive primer. Prime coat is not required on items delivered shop primed. Touch-up existing coating as needed.
 - a. Farrell-Calhoun: 1024/1069 Tuff-Boy Rust-Stop Red/Gray Primers
2. First and Second Coats - High gloss silicone alkyd enamel
 - a. Farrell-Calhoun: 23-251 Interior/Exterior Silicone Alkyd Gloss Enamel

B. Ferrous Metal: Exposed exterior steel and canopy structure.

1. Prime Coat - Rust inhibitive primer. Prime coat is not required on items delivered shop primed. Touch-up existing coating as needed.
 - a. Farrell-Calhoun: 1024/1069 Tuff-Boy Rust-Stop Red/Gray Primers
2. First and Second Coats Acrylic DTM Enamel
 - a. *Farrell-Calhoun: 8000 Line Waterborne 100% Acrylic DTM Enamel*

C. Zinc Coated Metal:

1. Prime Coat – Acrylic DTM Primer. Prime coat is not required on items delivered shop primed. Test previously painted surfaces to determine if a primer is required.
 - a. Farrell-Calhoun: 5-56 100% Acrylic DTM Primer.
2. First and Second Coats - Acrylic DTM Enamel. Test previously painted surfaces to determine if a primer is required.
 - a. Farrell-Calhoun: 8000 Line Waterborne 100% Acrylic DTM Enamel

D. Aluminum - Excluding pre-finished items:

1. Prime Coat – Acrylic DTM Primer. Test previously painted surfaces to determine if a primer is required.
 - a. Farrell-Calhoun: 5-56 100% Acrylic DTM Primer.
2. First and Second Coats – Acrylic DTM Enamel
 - a. Farrell-Calhoun: 8000 Line Waterborne 100% Acrylic DTM Enamel

E. Lane Marking Paint

1. Farrell-Calhoun: 1030/1031 Interior/Exterior Alkyd Zone Marking Paint White/Yellow

3.08 Interior Paint Schedule:

A. Ferrous Metal:

1. Prime Coat - Rust inhibitive primer. Prime coat is not required on items delivered shop primed. Touch-up existing coatings as needed.
 - a. Farrell-Calhoun: 1024/1069 Tuff-Boy Rust-Stop Red/Gray Primers
2. First and Second Coat – Alkyd Industrial Enamel
 - a. Farrell-Calhoun: 800 Line Interior/Exterior Industrial Gloss Enamel

B. Zinc Coated Metal:

1. Prime Coat. Prime coat is not required on items delivered shop primed. Test previously painted surfaces to determine if a primer is required.
 - a. Farrell-Calhoun: 697 Interior/Exterior 100% Acrylic Bonding Primer
2. First and Second Coat – Acrylic DTM Enamel
 - a. Farrell-Calhoun: 8000 Line Waterborne 100% Acrylic DTM Enamel

C. Painted Woodwork:

1. NA
 - a. Farrell-Calhoun: 699 Waterborne 100% Acrylic Enamel Undercoater
2. Second and Third Coats – Acrylic Semi-Gloss Enamel
 - a. Farrell-Calhoun: 3300 Evergreen 100% Acrylic Int/Ext Semi-Gloss Enamel

E. Epoxy Paint:

1. Provide products and installations in accordance with manufacturer's recommendations and instructions for the following substrates and conditions. Perform an adhesion test on previously painted surfaces to determine if a primer is required.
 - a. Gypsum Drywall
 - 1) First Coat: Farrell-Calhoun: 380 Perfik-Seal Interior Latex Primer/Sealer
 - 2) Second and Third Coats: 1260 Waterborne Pre-Cat Acrylic Epoxy
 - b. Concrete Masonry Units

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- 1) First Coat: Farrell-Calhoun: 470A Int/Ext Acrylic Latex Masonry Block Filler
- 2) Second and Third Coats: 1260 Waterborne Pre-Cat Acrylic Epoxy

G. Concrete Floor Sealer:

1. Deck-O-Seal: acrylic, Slip Resistant Concrete Deck sealer.
 - a. Install per Manufacture's Requirements.

H. CMU:

1. NA
 - a. First Coat: Farrell-Calhoun: 470A Int/Ext Acrylic Latex Masonry Block Filler
2. First and Second Coats of 100% acrylic semi-gloss enamel finish.
 - a. Farrell-Calhoun: 3300 Evergreen 100% Acrylic Int/Ext Semi-Gloss Enamel

END OF SECTION

**SECTION 10200:
LOUVERS AND VENTS**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.

1.02 Related Work:

- A. Section 07900 - Joint Sealers

1.03 System Description:

- A. Refer to AMCA Publication 501-85 for definitions of terms for metal louvers not otherwise defined in this section.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Construction Specialties, Inc.
 - 2. Reliable Metal Products.
 - 3. Ruskin Manufacturing Division, Phillips Industries, Inc.

2.02 Materials:

- A. Frames and louver blades fabricated from 0.081 inch extruded aluminum.
 - 1. Size and depth as indicated on drawings.
 - 2. Blade angle shall be 45 degrees unless otherwise indicated.
- B. Provide each exterior louver with bird/insect mesh screen formed of aluminum wire.

2.03 Anchors and Fasteners:

- A. Utilize anchors and fasteners of same basic metal and alloy as fastened metal. Do not use metals which are corrosive or incompatible with materials joined.
 - 1. Use type, size, and material required for type of loading and installation conditions.
 - 2. Use phillips type machine screws for exposed fasteners.

3. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance.
4. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

2.04 Fabrication:

- A. Fabricate louvers and vents to comply with requirements indicated for design, dimensions, materials, joinery, and performance.
- B. Preassemble louvers in shop to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of size indicated with allowances made for fabrication and installation tolerances of louvers, adjoining construction, and perimeter sealant joints.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.
- G. Join frame members to one another and to fixed louver blades as follows:
 1. With fillet welds, concealed from view; or mechanical fasteners; or a combination of these methods; as standard with louver manufacturer.
- H. Finish with factory baked-on enamel finish, color as selected by Architect.

PART 3: EXECUTION

3.01 Preparation:

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.02 Installation:

- A. Locate and place louver units plumb, level, and in proper alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.

- E. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return to shop items which cannot be refinished in field, make required alterations and refinish entire unit, or provide new units.
- F. Protect galvanized and nonferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry, or dissimilar metals.
- G. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses where required to make louver joints weathertight. Comply with Division 7 for sealants applied during installation of louver.

3.03 Adjust and Clean:

- A. Periodically clean exposed surfaces of louvers and vents, which are not protected by temporary covering, to remove fingerprints and soil during construction period; do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and with a mild soap or detergent not harmful to finishes. Rinse thoroughly and dry surface.

END OF SECTION

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**SECTION 10520:
FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of fire extinguishers and accessories is indicated on the drawings as follows:
 - 1. Wall mounted brackets.
 - 2. Fire extinguishers.

1.02 Related Work:

- A. Section 09900 – Painting
- B. ADA Accessibility Guidelines

1.03 System Description:

- A. Fire extinguishers as referenced in this section include units which can be hand-carried as opposed to fixed fire extinguishing systems or those which are equipped with wheels.

1.04 Quality Assurance:

- A. Obtain products in this section from a single manufacturer.

1.05 Submittals:

- A. Submit product data for each type of product included in this section.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Larsens Manufacturing Company

2.03 Fire Extinguishers:

- A. Provide fire extinguishers in locations as indicated on the drawings and as follows:

1. Provide multi purpose dry chemical type fire extinguisher 4A-60BC-FE; UL rated 4-A, 60-B, C; 10 lb nominal capacity; in enameled steel container for Class A, Class B and Class C fires.
 - a. Abbreviations indicated above identify extinguisher types related to UL classification and rating system, and not necessarily to type and amount of extinguishing material contained in extinguisher.
2. Fill fire extinguishers to comply with requirements of governing authorities and manufacturer's requirements.
3. Fire extinguisher color shall be 'RED'.
4. Provide manufacturer's standard wall mounting bracket for fire extinguisher locations not requiring a cabinet.

PART 3: EXECUTION

3.01 Installation:

- A. Install items included in this section at locations indicated on the drawings, and at heights to comply with applicable regulations of governing authorities.
 1. Fasten cabinets and mounting brackets securely to wall in accordance with manufacturer's instructions.
 2. Install fire extinguisher at each cabinet and mounting bracket location.
- B. Identify fire extinguisher cabinet with lettering spelling "FIRE EXTINGUISHER" painted on door by silk-screen process. Provide lettering on door as selected by Architect from manufacturer's standard letter sizes, styles, colors and layouts.
 1. Lettering shall not be installed until completion of cabinet field painting.

END OF SECTION

**SECTION 10800:
TOILET ACCESSORIES**

PART 1: GENERAL

1.01 Work Included:

- A. The Contractor shall furnish all materials and labor to make the work complete in every respect as specified herein, shown on the drawings, or reasonably implied to complete the construction.
- B. Extent of each type of toilet accessory shown on the drawings is specified herein.

1.02 Quality Assurance:

- A. Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- B. Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of products.
- C. Provide products of same manufacturer for each type of toilet accessory and for products exposed in same areas.

1.03 Submittals:

- A. Submit manufacturer's technical data and installation instructions for each toilet accessory.

PART 2: PRODUCTS

2.01 Acceptable Manufacturers:

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Bobrick, Inc.
 - 2. American Specialties, Inc.
 - 3. Bradley Corporation

2.02 Materials:

- A. Metals:
 - 1. Stainless steel shall comply with AISI Type 302/304, with polished No. 4 finish, 22 gage (.034") minimum.

2. Cold rolled sheet steel shall be commercial quality ASTM A 366, 20 gage (.040") minimum.
 - a. Provide surface preparation and metal pretreatment as required for applied finish.
 3. Galvanized steel shall comply as follows:
 - a. Sheet steel shall comply with ASTM A 527, G60.
 - b. Steel mounting devices shall comply with ASTM A 153, hot-dip galvanized after fabrication.
 4. Nickel and chromium plating by means of electro-deposit on base metal shall comply with ASTM B 456, Type SC 2.
- B. Mirror glass shall comply with FS DD-G-451, Type I, Class 1, Quality q2, 1/4" thick with silver coating, copper protective coating, and nonmetallic paint coating complying with FS DD-M-411.
- C. Anchors, fasteners, screws, bolts, and other mounting devices shall be of same material as toilet accessory product or of galvanized steel where concealed.

2.03 Fabrication:

- A. Fabricate products with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- B. Only a single, unobtrusive stamped logo of manufacturer, as approved by Architect, is permitted on exposed surfaces of toilet accessory products.
- C. On interior surface not exposed to view or on back surface, provide identification with a printed waterproof label or a stamped nameplate indicating manufacturer's name and product model number.

PART 3: EXECUTION

3.01 Installation:

- A. Provide blocking in wall as required for each toilet accessory installation.
- B. Install toilet accessories in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer. Install toilet accessories plumb and level, firmly anchored in locations indicated.

3.02 Adjust and Clean:

- 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 after removing temporary protective coatings.

3.03 Toilet Accessories:

A. Model numbers indicated refer to products as manufactured by "Bobrick".

Mark	Description	Model No.
C	Channel Frame Mirror	B - 165 2436
D	Soap Dispenser	B - 2111
F	Surface Mounted Paper Towel Dispenser	B – 72860
G	Surface Mounted Toilet Tissue Dispenser	B - 2890
H,J,	Grab Bars	B – 6806
K	Surface Mounted Baby Changing Station	KB 200 - 05
L	Coat Hook	B – 76717

END OF SECTION

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**SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Common work results for requirements specifically applicable to Division 22.
- B. Requirements of Division 01 Specifications, General Provisions of the Contract and General and Supplementary Conditions apply to this Division.

1.02 REGULATORY REQUIREMENTS

- A. Perform Work specified in Division 22 in accordance with the codes and standards listed below of the latest applicable edition adopted by the authority having jurisdiction. Where these Specifications are more stringent, they shall take precedence. In case of conflict, obtain a decision from the Architect.
 - 1. NFPA 101: Life Safety Code
 - 2. ANSI Handicapped Code-A117.1
 - 3. U.L Fire Resistance Index
 - 4. IBC: International Building Code, with Mechanical and Plumbing Codes
 - 5. NFPA 30: Flammable and Combustible Liquids Code
 - 6. NFPA 54: National Fuel Gas Code
 - 7. NFPA 70: National Electrical Code
 - 8. NFPA 72: National Fire Alarm and Signaling Code
 - 9. NFPA 101A: Guide on Alternative Approaches to Life Safety
 - 10. NFPA 101B: Standard on Means of Egress for Buildings and Structures
 - 11. NFPA 241: Standard for Safeguarding Building Construction, Alteration and Demolition Operations
 - 12. Special regulations, supplements, and amendments of the State and/or local authorities having jurisdiction.

1.03 REFERENCE STANDARDS

- A. ANSI: American National Standards Institute
- B. ASME: American Society for Mechanical Engineers
- C. ASTM: American Society for Testing and Materials
- D. AWWA: American Water Works Association
- E. MSS: Manufacturer's Standardization Society of the Valve and Fitting Industry
- F. NEMA: National Electrical Manufacturers' Association
- G. NFPA: National Fire Protection Association
- H. UL: Underwriters' Laboratories, Inc.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01 including required number of copies.
- B. Include Products as specified in the individual sections of Division 22.
- C. Prepare shop drawings completely independent of the Engineer of Record's CADD files. Should the Contractor or Vendor wish to use the Engineer of Record's CADD files or Revit model as the basis for developing their shop drawings, a release form, obtainable from the Engineer or Architect, must be signed.
- D. Submit copies of shop drawings in accordance with Division 01, for plumbing equipment and piping systems including:
 - 1. Concrete pads and foundations including anchor bolt and sleeve locations.
- E. Brochures: Submit manufacturer's product data and brochures including:
 - 1. Complete descriptions.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2. Illustrations and wiring diagrams.
3. Rating data, accessories, dimensional data, and applicable options and features marked for the specific items scheduled on drawings and specified herein.
4. Capacities stated in the terms specified
5. Performance and rating data for plumbing equipment and performance curves for pumps.

1.05 QUALITY ASSURANCE

- A. Lead Free: All wetted surface of pipe, fittings and fixtures in potable water systems shall have a weighted average lead content equal to or less than 0.25% per the Safe Drinking Water Act (Section 1417) as amended January 4, 2011.
- B. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.06 FIELD CONDITIONS

- A. Layouts indicated on drawings are diagrammatical and intended to show relative positions and arrangement of piping and equipment. Coordinate work with other trades and with measurements obtained at the job site, as applicable, prior to installation. Generally, install work in locations shown on Drawings. Provide necessary rises, drops, and offsets to fit in the available space unless prevented by Project conditions.
- B. If prevented by project conditions, prepare drawings showing proposed rearrangement of Work, including changes to Work specified in other sections. Obtain permission of the Architect before proceeding.
- C. Place anchors, sleeves, and supports prior to pouring concrete or installation of masonry work.
- D. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner and all affected trades.
- E. Determine sizes and verify locations of existing utilities on or near site.
- F. Keep roads and other spaces clear of materials and debris.
- G. Visit site and be informed of conditions under which Work must be performed.
- H. Locate equipment requiring periodic servicing so that it is readily accessible. Provide means of service access, following appropriate manufacturer's recommended service clearance space or, as applicable, means of access using duct, wall, or ceiling access doors.
- I. Install piping to leave sufficient space for AHJ inspection of wall construction. Coordinate pipe routing with other trades including but not limited to Divisions 21, 23, 26 and 28.

1.07 FEES AND PERMITS

- A. Obtain and pay for all necessary permits and inspection fees required to perform Division 22 work.

1.08 COORDINATION DRAWINGS

- A. Prior to commencement of installation, assist in preparation of coordination drawings for work under this Division, as specified in Division 01. Fully cooperate with persons coordinating and performing work under other Divisions.
- B. Drawings shall not be formally submitted but shall be kept on site for reference. Notify the Architect of conflicts that cannot be resolved.
- C. Coordination drawings shall be prepared to include the following:
 1. Drawn to a scale of 1/4" = 1' - 0".
 2. Room dimensions.
 3. Sheet size matching contract documents.
 4. Show plumbing equipment, structural columns and beams.
 5. Ductwork sizes with bottom elevation from finished floor.
 6. Concrete pad and foundation layouts including anchor bolt and sleeve locations.
 7. Dimensioned floor drain locations.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

8. Wall mounted equipment.
9. Piping 2" and larger.
10. Suspended equipment and piping.
11. Backflow preventers.
12. Floor to floor and ceiling heights.

1.09 COMPLETENESS OF WORK

- A. The Contract Documents depict plumbing systems which are intended to be complete and functioning systems. All products, materials, and labor necessary to render a fully functional system to fulfill the design intent shown on the documents shall be provided by the Contractor.
- B. Catalog numbers referenced throughout the Division 22 Drawings and Specifications are intended to convey a general understanding of the type and quality of the product required. Where written descriptions differ from information conveyed by a catalog number, the written description shall govern. No extra shall be allowed because a catalog number is found to be incomplete or obsolete.

1.10 PRODUCT SUBSTITUTIONS

- A. Comply with provisions of Division 01.

1.11 PRODUCT PROCUREMENT AND SUBSTITUTION

- A. Comply with provisions of Division 01.

1.12 RECORD DRAWINGS

- A. Provide record drawings that illustrate the work of Division 22 as finally constructed. Deliver record drawings to the Architect in a form suitable for reproduction. Comply with the provisions and requirements of Division 01.
- B. Record drawings shall reflect all changes made to the Contract Documents, whether generated by addenda, change orders, or field conditions. Maintain a daily record of these changes and keep current set of drawings showing these changes.

1.13 OWNING AND OPERATING MANUALS

- A. Comply with the requirements of Division 01, but provide a minimum of three sets.
- B. Manuals shall include clear and comprehensive instructions with appropriate graphics and project specific marked data to enable owner to operate and maintain all systems specified in this Division.
- C. Copies of reviewed submittals for furnished equipment shall be included.

PART 2 - PRODUCTS

2.01 EQUIPMENT SUPPORTS

- A. Structural steel for supports: ASTM A36.
- B. Use galvanized members installed in areas of high humidity or condensation, and outside.
- C. Furnish other members with shop coat of red primer.
- D. Retouch primer after field welding.

2.02 FLASHINGS AND COUNTERFLASHINGS

- A. Furnish materials and coordinate installation for flashing and counterflashing roof penetrations for vents, pipe, drains, and ducts.
- B. Materials:
 1. Sheet metal: 24-gauge minimum ASTM A525, Class G90
 2. Sheet lead: 3 pounds per square foot
 3. Stainless steel: Minimum 20 gauge
 4. Sheet copper: 24 OZ/SF
- C. Vent Stack Fitting (threaded roof coupling): Josam 26450 or Jay R. Smith 1750.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2.03 WALL AND CEILING ACCESS PANELS

- A. Style and type as required for material in which installed.
- B. Size: 12"x12" minimum, as indicated, or as required to allow inspection, service and removal of items served.
- C. 14-gauge minimum sheet metal for doors, 16-gauge frames of cadmium-plated or galvanized construction. Doors shall have expanded plaster rings where located in plaster walls or flanged finish where located in drywall or block construction.
- D. Panels shall have spring hinges with screwdriver locks in non-public areas. Key lock, keyed alike, for panels in public areas.
- E. Prime painted or rust inhibitive paint finish.
- F. UL labeled when in fire-rated construction, 1-1/2 hour rating.
- G. Provide in walls, floors, and ceilings to permit access to all equipment and piping requiring service or adjustment. Examples of such equipment needing access are valves, and equipment needing periodic or replacement maintenance.
- H. Furnish and locate access panels under this Division. Coordinate with trades who are responsible for building system in which panels are to be installed.
- I. Acceptable manufactures: Milcor, Nystrom, Karp, J.L. Industries, or Williams Brothers.
 - 1. For masonry and drywall construction: Milcor Style M
 - 2. For plastered masonry walls and ceiling: Milcor Style K
 - 3. For ceramic tile or glazed structural tile: Use stainless steel panels

2.04 PIPE ENCLOSURES

- A. For exposed vertical piping: 18 gauge stainless steel (type 302) with No. 4 finish.
 - 1. Extend from 2" above ceiling to equipment or island partition
 - 2. Size covers to contain number of pipes served
- B. Minimize number of covers by enclosing maximum number of pipes in each drop.
- C. Anchor to equipment or partition.
- D. Fasten seams and joints with stainless steel pop rivets.
- E. Provide 1-1/2" ceiling flange as closure.

2.05 PROTECTION AGAINST CONTACT

- A. Metallic piping, except for cast iron, ductile iron and galvanized steel, shall not be placed in direct contact with steel framing members, concrete or cinder walls and floors or other masonry. Metallic piping shall not be placed in direct contact with corrosive soil. Where sheathing is used to prevent direct contact with the soil, the sheathing shall have a thickness of not less than 0.008 inch (8 mil) and the sheathing shall be made of plastic.
- B. Where piping penetrates rated walls, partitions and floors, sleeves and fire safing shall be used to maintain the integrity of the wall or floor.

2.06 SLEEVES

- A. Materials:
 - 1. Concrete floors, concrete and masonry walls: 18 gauge galvanized steel tube with welded longitudinal seam or Sch. 10 galvanized steel pipe.
 - 2. Drywall partitions: 18 gauge galvanized steel sheet metal or Sch. 10 galvanized steel pipe.
 - 3. Cast iron: Cast or fabricated pipe equivalent to ductile iron pressure pipe with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast iron sleeve with integral clamping flange. Include clamping ring, bolts and nuts for membrane flashing. Provide under deck clamp with clamping ring and set screws.
- B. Sleeves shall be sized such that the annular space between outside surface of pipe or pipe insulation and the inside surface of the sleeve is not less than 1/2". Provide larger annular

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

space if required by firestopping product installation instructions or water proofing seal at exterior wall penetrations.

- C. Sleeves supporting riser piping 4" and larger shall have three 6" long reinforcing rods welded radially at 120 degree spacing to the sleeve and shall be installed with the rods embedded in the concrete slab as the floor slabs are poured.
- D. Exterior wall and floor penetrations shall be sleeved and sealed with a Link Seal Modular Seal by GPT Industries or Flexicraft Industries.
 - 1. Exterior wall and floor penetrations: Install Link Seal Modular Seal by GPT or Flexicraft Industries. Seal shall be suitable for use in direct ground contact, water or atmospheric conditions with EPDM seal element. Provide Nitrile rubber seal element where subject to oils and fuel. All bolts, nuts and fasteners shall be Steel with 2-part Dichromate corrosion inhibiting coating or Type 316 Stainless steel.

2.07 ESCUTCHEON PLATES

- A. Provide B & C No. 10 or equal chrome plated escutcheon plates where pipes penetrate partitions or ceilings in finished spaces or areas.

PART 3 - EXECUTION

3.01 EXCAVATING AND BACKFILLING

- A. Contractor shall review Divisions 31 and 33 and shall perform excavation and backfilling in accordance with the most stringent requirements. Contractor shall request clarification before proceeding if there are conflicting instructions.
- B. Contract Documents show the approximate location of underground utilities known to exist in the area of construction. Contractor shall determine the exact location of utilities.
 - 1. Locate and uncover existing utilities which require new connections before trenching in the vicinity of indicated utility connection.
 - 2. Clear all vegetation and other objectionable material from the area required for the excavation and backfill operations. Disposal of material removed by the clearing operation shall be approved by the Owner's representative.
- C. Provide trenching, excavating, and backfilling necessary for performance of work indicated in Contract Documents.
- D. Excavate to depths indicated on the drawings or as necessary to permit the installation of pipe, bedding, backfill, structures or appurtenances. Provide a firm, undisturbed, uniform surface in the bottom of trenches. Where excavation exceeds the required depth, bring the excavation to proper grade through the use of an approved incompressible backfill material. Store excavated material and dispose of surplus excavated material.
 - 1. Excavate trench to sufficient depth to permit a minimum of 36" of cover over the top of the pipe unless otherwise required by pipe elevations indicated on the Drawings. The trench width shall be 18" plus the diameter of the pipe and/or the largest bell.
- E. Trenching and excavation shall be unclassified. No extra will be paid in the event that rock is encountered.
 - 1. Should rock excavation be required, use only experienced personnel for blasting.
 - 2. Exercise extreme care when blasting with signals of danger given before firing any charge.
 - 3. Conform to and obey all public authority regulations for the protection of life and property.
- F. Provide sheathing, shoring, dewatering, and cleaning necessary to keep trenches and their grades in proper condition and to meet applicable codes.
- G. Provide a minimum of 6" of No. 67 crushed stone or clean sand bedding, or equal, in the bottom of the trench to maintain the required grade and continuous support of the bottom quadrant of the pipe. On bell and spigot piping, dig bell holes so bottom of bells do not support pipe.
- H. Upon completion of excavation, and prior to the laying of the pipe, the trench bottom shall be brought up to the required elevation with min. 6" pipe bedding. Pipe bedding shall be select material deposited in the trench, and shall be compacted, leveled off, and shaped to obtain a

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

smooth compacted bed along the laying length of the pipe. Material for pipe bedding shall comply with local codes. In absence of local code requirements the bedding shall be bank sand or select back fill material approved by the Architect. Any material used shall pass a 1/4 inch screen.

- I. Clean and inspect pipe for defects before lowering into trench for assembly. Install pipe in accordance with provisions of Contract Documents and with the recommendations of the pipe manufacturer.
 - 1. Ensure pipe is of proper strength and classification for specified service. Discard damaged or defective pipe discovered during pipe laying operations.
 - 2. Maintain alignment and grade during layout operation. Use acceptable method for maintaining grade and alignment to produce desired results.
- J. Where crushed stone backfill is required, use No. 67 stone, clean sand or equal.
- K. After bedding has been shaped and the pipe assembled, place crushed stone carefully around the pipe and to a point 12" above the pipe. Backfill above this point shall be as described below:
 - 1. Backfill areas of vehicular traffic shall consist entirely of crushed stone and compacted crusher run material.
 - 2. Backfill for shoulders of roadways, sidewalk, and slab on grade structures shall consist entirely of crushed stone.
 - 3. Backfill areas not subject to vehicular traffic may consist of suitable excavated material as described above.
- L. Where crushed stone is not required, suitable excavated material may be utilized. This includes fine, dry earth or a mixture of earth and shot rock. Rocks larger than 6" in any dimension may not be included in any portion of the backfill material.
- M. Trenches shall be backfilled only after piping has been inspected, tested, and approved by the Architect. All backfill material shall be placed in the trench either by hand or by approved mechanical methods. The compaction of backfill material shall be accompanied by tamping, with hand tools or approved pneumatic tampers, by using vibratory compactors, by puddling, or by any combination of the three. The method of compaction shall be approved and all compaction shall be done to the satisfaction of the Architect. Backfill completely around pipe, including 18" above the pipe, with suitable bank sand, tamped in 4" layers under, around, and over pipe. Water down backfill as required. The remainder of the backfill shall be select backfill material tamped at intervals of no more than 12" depths. All materials to be used as selected material backfill shall be approved by the Architect. If, in the opinion of the Architect, the excavated material does not meet the requirements of selected material, the Contractor shall be required to screen the material prior to its use as selected material backfill. Material used in the upper portion of the backfill or subgrade shall not contain stone, rock, or other material larger than six inches in its longest dimension. No wood, vegetable matter, or other material which, in the opinion of the Architect, is unsuitable shall be included in the backfill. The upper 24" of backfill may be water jetted, if desired. Backfill shall be brought up to finish grade identified on the Architectural Drawings, including additional backfill required to offset settlement during consolidation.

3.02 CUTTING AND PATCHING

- A. Repair or replace damage caused by cutting or installation of work specified in Division 22.
- B. Perform repairs with materials which match existing and install in accordance with the appropriate section of these specifications.

3.03 FLASHING AND COUNTERFLASHING

- A. Counterflash pipes where penetration of roofs and outside walls occur.

3.04 DELIVERY, STORAGE, AND PROTECTION

- A. Insofar as possible, deliver items in manufacturer's original unopened packaging. Where delivery in original packaging is not practical, provide cover and shielding for all items with protective materials to keep them from being damaged. Use care in loading, transporting, unloading, and storing to keep items from being damaged.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- B. Store items in a clean, dry place, and protect from damage. Plumbing equipment may not be staged or stored outdoors unless intended for outdoor use.
- C. Protect nameplates on motors, pumps, and similar equipment. Do not paint or insulate over nameplate data.
- D. Protect plumbing fixtures and brass or chromium plated trim, valves and piping from damage. Cover fixtures during work of finishing trades.
- E. Keep dirt and debris out of pipes.
- F. Repair, restore, and replace damaged items.
- G. Cover factory finished equipment during work of finished trades.

3.05 SLEEVES

- A. Floors and Roof Slabs: Sleeve all pipe penetrations including mechanical equipment rooms and other wet areas. Extend sleeve 2" above finished floor and roof, except piping within pipe chases. Sleeve shall be flush with underside of floor unless required for cast iron clamping ring to be secured.
- B. Masonry or concrete walls: Sleeve all pipe penetrations. Sleeves shall be flush on both sides of wall.
- C. Seal voids between outside surface of sleeve and wall, partition or floor. Seals shall be airtight.
- D. Clearance between sleeve and pipe: Minimum of 1/2 inch for hot piping and 1 inch for cold piping or as otherwise dictated by U.L. Fire Resistance Directory.
- E. Wall Penetrations not sleeved or firestopped:
 - 1. Seal voids between pipe and partition with appropriate joint sealant material. Seals shall be airtight.
- F. Core drilled holes in concrete floors: Sleeves are not required. Seal airtight and to maintain the floor rating integrity.

3.06 ESCUTCHEON PLATES

- A. Provide chromium plated escutcheon plates for exposed uninsulated pipes projecting through floors or wall in finished spaces. Mechanical rooms, storage rooms, electric closets and housekeeping closets are not considered finished spaces.
- B. Clearance between sleeve and pipe: Minimum of 1/2" for hot piping and 1" for cold piping or as otherwise dictated by the UL Fire Resistance Directory.

3.07 CLEANING PLUMBING SYSTEMS

- A. General Cleanup:
 - 1. Upon completion of contract and progressively as work proceeds, clean up dirt, debris, old materials, etc., and remove from site, keeping premises in neat and clean condition to satisfaction of the Architect. See Division 01 of specifications for further requirements.
 - 2. Seepage, discoloration or other damage to parts of the building, its finish, or furnishings due to Contractor's failure to properly clean piping systems shall be repaired without cost to the Owner.
- B. Factory Finishes:
 - 1. Clean items with factory finishes. Touch up bare places, scratches and other minor damage to finishes. Use only factory supplied paint of matching color and formula. If finishes are badly damaged or if there are many damaged, scratched or bare places, refinish the entire item.
- C. Domestic Water System:
 - 1. Flush system progressively by opening building operable valves, faucets and hose bibs and permitting flow to continue from each unit until water runs clear.
 - 2. Sterilize system in accordance with requirements of State Department of Public Health by the following method or other methods acceptable to authority having jurisdiction.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- a. Introduce chlorine or a solution of calcium or sodium hypochlorite. Fill lines slowly and apply sterilizing agent at a rate of 50 ppm of chlorine as determined by residual chlorine tests at ends of lines. Open and close all valves while system is being chlorinated.
- b. After sterilizing agent has been applied and left standing for 24 hours, test for residual chlorine at ends of lines. If test indicates there is less than 25 ppm, repeat sterilizing process.
- c. After system has been standing 24 hours and test indicates at least 25 ppm of residual chlorine, flush out system until all traces of chemical used are removed.
3. Have local health department check and approve system before connecting it to existing water system. Document to clearly note the exact test locations within each facility where the water test was performed.
4. If the domestic water system is sterilized more than 24 days prior to the owner/user taking beneficial occupancy, the entire water system shall be re-sterilized so that it is tested clean as noted above at the time of occupancy.
 - a. All piping, dead legs, safety showers, eyewashes, and faucets shall be opened and thoroughly flushed for at least 15 minutes prior to re-sterilization.
5. The domestic water system shall be tested for the presence of Legionella by a third party testing laboratory certified and experienced in Legionella testing prior to the owner taking occupancy. The location and results of testing must be documented and presented to the owner.

3.08 TESTING PLUMBING SYSTEMS

- A. Test all systems and equipment installed to demonstrate proper operation.
- B. Advise the Architect of scheduled systems testing and completed system demonstration/operation schedules so that he may witness, if desired.
- C. Correct and retest work found defective or leaking when tested.
- D. Make repairs to piping systems with new materials. Peening, doping, or caulking of joints or holes will not be acceptable.
- E. Domestic Water Piping: Test hot and cold water piping systems upon completion of rough-in, before fixtures are connected, at a hydrostatic pressure of 125 psig or 150% of working pressure whichever is greater for a period of two hours.
- F. Flush Valves: Test all flush valves for proper operation.
- G. Drainage and vent system
 1. Test plug opening(s) to permit system to be filled with water, and subject system to a 10 foot head of water pressure. System shall hold water for 30 minutes without a drop in water level in a 4 inch diameter standpipe, and without visible leakage.
 2. If system is tested in sections, a minimum head of 10 feet shall apply.
- H. All plumbing equipment and systems must be balanced by a certified third party as noted in Division 23 Testing and Balancing requirements.
- I. Records of Testing: Maintain records of system testing and results thereof. Deliver results as part of the project closing file and on an intermediate basis as requested by the Architect.

END OF SECTION

**SECTION 22 05 23
VALVES FOR PLUMBING PIPING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Valves for plumbing systems.

1.02 RELATED REQUIREMENTS

- A. Section 22 11 16 - Domestic Water Piping

1.03 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01. Valves used or indicated to be used in domestic potable water systems must be lead free in accordance with the Reduction of Lead in Drinking Water Act effective January 4, 2014.

1.04 QUALITY ASSURANCE

- A. Lead Free: All wetted surface of pipe, fittings and fixtures in potable water systems shall have a weighted average lead content equal to or less than 0.25% per the Safe Drinking Water Act (Section 1417) as amended January 4, 2011.
 - 1. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.
- B. Valve bodies, shells, and seats: Factory tested.
- C. Bronze body valves:
 - 1. Materials for pressure containing parts: ASTM B-62 (less than 200 psi), B-61 (200 psi and above)
 - 2. Design, workmanship, testing: MSS-SP-80
- D. Iron body valves:
 - 1. Materials for pressure containing parts: ASTM A126, Grade B
 - 2. Face-to-face and end-to-end dimensions: ANSI B16.10
 - 3. Design, workmanship, testing: MSS-SP-70, 71
- E. Butterfly valves:
 - 1. Face-to-face and end-to-end dimensions: MSS-SP-67
- F. Pressure Reducing Valves:
 - 1. Pressure reducing valves 2" and less to have bronze body construction meeting ASSE Standard B356, ANSI A112.26.2.
 - 2. Pressure reducing valves 2-1/2" and up to be cast iron construction, ASTM A126 Class B. Valve to be epoxy coated inside and outside. Unit to have low flow bronze bypass valve.
- G. Valve stems: ASTM B584-78, Class 13C (cast silicon brass), ASTM B-371-79, Alloy A (rolled silicon brass), or other material equally resistant to dezincification.
- H. Pressure castings: Free of impregnating materials.
- I. Valve name or trademark and working pressure stamped or cast into body.
- J. Standard for 200 PSI and 300 PSI valves with metallic seats: ASTM B61-76.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Iron body valves: Nibco, Apollo, Stockham, Crane, Milwaukee, Dezurik, Mueller or Kennedy
- B. Bronze body valves: Nibco, Apollo, Stockham, Milwaukee, Dezurik or Kennedy
- C. Butterfly valves: Nibco, Apollo, Stockham, Crane, Milwaukee, Mueller, Victaulic (grooved only) or Dezurik
- D. Ball valves: Nibco, Apollo, Watts, Milwaukee, Jamesbury or Hammond
- E. Pressure Reducing Valves: Watts, Apollo, Nibco.

2.02 MATERIALS

- A. Nibco Figure numbers are indicated below unless noted otherwise:
- B. Check Valves:
 - 1. Domestic Water:
 - a. 2" and less, Figure T-413-Y-LF, or S-413-Y-LF, threaded or solder, Lead Free silicone bronze body, Class 150, PTFE seat
 - b. 2-1/2" and up: Iron body, bronze alloy disc, bronze alloy or Buna-N seat, stainless steel spring, flanged, Class 125, Lead Free, globe style, F-910-LF; or F-960-LF, Class 250.
- C. Ball Valves
 - 1. Domestic Water
 - a. 2" and less, Figure T585-80-LF or S-585-80-LF, 2-piece, full port, 600 psi WOG, PTFE packing seal and seat ring, lead free silicone bronze alloy body and ball.
 - b. 2-1/2" and up, Watts G4000-FDA-Lead Free-200 psi, 2 piece, full port, cast iron, flanged, heat fused epoxy coating, stainless steel ball and stem, PTFE seat, Class 125 meeting MSS-SP-72-92 or equal.
 - 2. Provide ball valves with locking handles.
 - 3. Provide extended lever for insulated service.
- D. Butterfly Valves - 2-1/2" And Up:
 - 1. Domestic Water: Figure LD-2000, ductile iron body, Lead Free, lug type, 200 psi, Class 125, EPDM liner and seals, and aluminum bronze disc, meeting AWWA C504-88.
 - 2. Butterfly valves rated bubble tight for dead end service at full pressure in both directions without the need for downstream blind flange.
 - 3. Provide hand wheel and closed housing worm gear on valves 6 inches and larger. Provide clamp lock hand lever operators on valves less than 6 inches.
 - 4. Grooved piping: Victaulic Series 608N, brass body, rated bi-directionally to 300 psi, aluminum bronze disc, fluoroelastomer seat, -20 degrees F to +250 degrees F temperature range.
- E. Pressure Reducing Valve:
 - 1. 2" and less, Watts Series U5 or 223 Lead Free with integral or attached strainer. 300 psi inlet pressure and bronze body construction.
 - 2. 2-1/2" and up, Watts ACV 115E Lead Free automatic control valves with a 263 reducing valve. 400 psi inlet pressure with stainless steel seats. Cast iron body with epoxy coating inside and outside.
- F. Valve connections: Two inches and smaller - threaded; 2-1/2 inches and larger - flanged.
- G. Provide chain operators for gate valves, butterfly valves, and plug cocks located in mechanical rooms as required by plumbing plans or where valves are mounted above 7'-0" A.F.F.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Furnish and install valves in each piping connection at each piece of plumbing equipment to allow equipment to be isolated from piping systems.
- B. Furnish and install valves in all piping systems to isolate each floor or main section of the building. Install sufficient number of valves to minimize the portion of the system which must be shut down for service or maintenance purposes.
- C. Furnish and install valves above each group of plumbing fixtures.
- D. Install valves in water piping systems so ordinary maintenance work can be performed on the equipment that the valves isolate, without having to drain the system beyond the valve.
- E. All valves above drywall access panels shall be located within one foot of access panels including valves located above ceilings.
- F. Locate valves so as to be easily accessible by maintenance personnel.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- G. Pressure reducing valves shall be installed on equipment as required per manufacturer's recommendation and on main lines serving any facility when the static pressure exceeds 80 psi as required by the State or Local Plumbing Code.
- H. All plumbing systems including pumps, domestic water piping and valve settings and hot water recirculation systems must be tested and balanced. Coordinate with Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC for test and balance requirements.

END OF SECTION

**SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hangers for plumbing piping

1.02 RELATED REQUIREMENTS

- A. Section 22 11 16 - Domestic Water Piping
- B. Section 22 13 16 - Storm And Sanitary Waste And Vent Piping
- C. Section 22 07 00 - Plumbing Insulation

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- C. MFMA-4 - Metal Framing Standards Publication
- D. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation
- E. NFPA 101 - Life Safety Code
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with the structural requirements.

1.05 DELIVERY, STORAGE AND PROTECTION

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

1.06 SUBMITTALS

- A. Submit product data and information in accordance with the provisions of Division 01.
- B. Indicate where each type of hanger will be used, what piping service, if pipe system will be insulated and with what insulation thickness.
- C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instruction for storage, handling, protection, examination, preparation and installation of product.

PART 2 - PRODUCTS

2.01 HANGERS

- A. Acceptable Manufacturers ; Anvil, Carpenter and Patterson, Fee and Mason, B-Line, Viking, Reliable, and Michigan. Anvil model numbers are used for reference.
 - 1. Anvil Figure #260 MSS Type 1, clevis hangers for:
 - a. Non-insulated steel and galvanized piping 2" through 24" diameter
 - b. Non-insulated cast iron pipe
 - c. Non-insulated PVC piping
- B. Anvil Figure #260 clevis hangers with Figure 167, MSS Type 40 galvanized insulation protection shields (sized for supporting insulation having a compressive strength of 4 psi). Support piping on outside of insulation. Size hangers so that pipe insulation passes through them without interruption.
 - 1. Domestic hot water piping above 160 degrees F. 4" diameter and less
 - 2. All other insulated piping
- C. Anvil Figure CT-69, MSS Type 10 with adjustable wrought tubing ring hanger, copper plated for:
 - 1. Non-insulated copper tubing with no longitudinal movement
 - 2. Isolation of copper tubing from dissimilar material shall also be accomplished through the use of PHD Manufacturing, Model Numbers 2501 - 2514 Unistrut clamps with PVC inserts or PHD model number 143 PVC coated swivel ring hangers.
- D. Anvil Figure #CT-121, MSS Type 8, riser clamps (at floor penetrations) to support:
 - 1. Copper pipe risers
- E. Anvil Figure #261, MSS Type 8, riser clamps (at floor slab penetrations) to support:
 - 1. Steel pipe risers
 - 2. PVC pipe risers
- F. Anvil Powerstrut Trapeze Hangers: Where three or more lines of pipe run parallel, support them with trapeze hangers.
- G. Water piping supports within walls to be by Caddy, Holdrite, Sioux Chief or approved equivalent. Support vertical drops and piping at fixture supplies in wall. Hanger material to be suitable for piping material installed. Piping supports shall be installed per manufacturer's recommendations.

2.02 METAL CHANNEL (STRUT) FRAMING SYSTEMS:

- A. Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field assembly of supports.
- B. Acceptable Manufacturers: Anvil, B-Line, Unistrut, or approved equal.
- C. Furnish channels and associated fittings, accessories, and hardware produced by a single manufacturer.
- D. Comply with MFMA-4.
- E. Material and Dimensions: Galvanized steel; 1-5/8 inch width by 1-5/8 inch height; 14 gauge minimum.

2.03 INSERTS

- A. Concrete Insert: Anvil Figure #281, MSS Type 18, universal concrete inserts, adequately sized and correctly positioned to support full load operating systems.
- B. Concrete Insert, Wedge Type: Anvil Figure #281, 1/4" to 7/8"
- C. Lightweight Concrete Insert: Anvil Figure #285
- D. Continuous Concrete Insert: Anvil Powerstrut Figure #PS-349, pre-galvanized

2.04 EXPANSION ANCHORS

- A. Hilti Kwik-bolt, zinc-plated, metal expansion anchor.

- B. Anchor to meet U.L., ICBO-4627 and FM listings.

2.05 HANGER RODS

- A. Provide mild steel all-thread rods with maximum loads as follows:
 1. 3/8" - 300 lbs
 2. 1/2" - 600 lbs
 3. 5/8" - 1,200 lbs
 4. 3/4" - 2,000 lbs
 5. 1" - 5,000 lbs

2.06 CLAMPS

- A. C-Clamps: Anvil Figure #92, MSS Type 23.
 1. Use these for attaching hangers to steel beams. Do not weld hanger rods to structural steel members.
- B. Malleable Beam Clamps: Anvil Figure #218, MSS Type 30: Use these for attaching hangers to bar joists. Attach clamps to top chord of bar joists only. Confirm with structural engineer for maximum loading and restrictions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as required.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, evaluation report and conditions of use where applicable.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit or other systems.
- D. Unless specifically indicated or approved by the Architect, do not provide support from suspended ceiling grid support system or ceiling grid.
- E. Do not penetrate or otherwise notch or cut structural members without approval of the Architect and Structural Engineer.
- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
- H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Support pipes on specified hangers so that equipment, pumps, and fittings do not bear weight or stresses from vibration and swaying of pipe. Support pipe risers at regular intervals in pipe shafts at least once at each floor level or a maximum of 12'-0" apart. Do not use perforated metal, strap iron, or band iron. Do not make offsets in hangers.
- K. Maximum allowable spacing of pipe hangers is listed below. Space hangers and brackets at closer intervals where necessary to maintain levels, slopes, and drainage, or to prevent

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Dyersburg, Tennessee**

sagging or swaying of pipe.

L. COPPER PIPE - Water

1. 1/4" to 1-1/4" - 5'0" O.C.
2. 2" to 2-1/2" - 8'0" O.C.
3. 3" and above - 10'0" O.C.

M. CAST IRON PIPE

1. Space hangers not to exceed 5 feet on centers. Provide minimum of two hangers per section within 18" of joint on barrel and at change of direction and branch connection. Install hanger and supports per CISPI 301-12.

N. PVC PIPE

1. 3/4" to 3" - 4' O.C.
2. 4" and above - 6' O.C.

END OF SECTION

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Installation of all tags, markers and identification for plumbing piping and equipment.

1.02 RELATED REQUIREMENTS

- A. Section 099000 - Painting and Coating: Identification painting.
- B. Section 220700 - Plumbing Insulation.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01.
- B. List: Submit list of wording, symbols, letter size, and color coding for plumbing identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Water Heaters: Nameplates.
- B. Domestic Water Piping: Pipe markers.
- C. Storm, Waste and Vent Piping: Pipe Markers
- D. Valves: Tags.

2.02 NAMEPLATES

- A. Acceptable Manufacturers:
 - 1. Seton Identification Products: www.seton.com/#sle.

2.03 TAGS

- A. Acceptable Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 4. Seton Identification Products: www.seton.com.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Also provide an Xcel spread sheet of all valves, with location and tag number to owner.

2.04 PIPE MARKERS

- A. Acceptable Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.

- B. Colors and lettering: Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Potable hot and cold water, Other make-up Water: Green with white letters.
 - 2. Storm water: Green with white letters.
 - 3. Sanitary waste and vent: Green with white letters.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare surfaces in accordance with Section 099123 for stencil painting.
- B. Piping requiring insulation shall be insulated prior to pipe identification being installed.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions. Install markers at least once in every room and at no more than 20 foot intervals.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- G. Use tags or pipe markers on piping 3/4 inch (20 mm) diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet (6 m) on straight runs, at least once in every room and including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Install equipment with plastic nameplates.

END OF SECTION

**SECTION 22 07 00
PLUMBING INSULATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Insulation of plumbing piping
- B. Insulation of plumbing equipment

1.02 RELATED REQUIREMENTS

- A. Section 23 07 00 - HVAC Insulation

1.03 DEFINITIONS

- A. Exposed - Equipment and piping in areas which will be visible without removing ceilings or opening access panels.
- B. Concealed - Installed above ceiling, in walls or chases.
- C. Outdoors - Exposed to the weather or ambient conditions.
- D. Underground - Buried.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation procedures for review in accordance with the requirements of Division 01.

1.05 QUALITY ASSURANCE

- A. Insulation, adhesives, coatings, sealers, jackets and tapes shall have a flame spread rating of 25 or less and smoke development of 50 or less in accordance with ASTM E-84 and UL 723.
- B. Materials shall meet the requirements of NFPA 90A.
- C. Manufacturer qualifications: ISO 9001-2000 Certified specializing in manufacturing the products specified in this section.
- D. Applicator qualifications: Company specializing in the installation of the specified products and the work required to install the products with not less than 5 years experience.

PART 2 - PRODUCTS

2.01 PIPE AND EQUIPMENT INSULATION

- A. Materials for Pipe and Equipment: Provide factory premolded insulation for pipe, pipe fittings, and valves.
- B. Fitting insulation: Same thickness and material as adjoining pipe insulation.
- C. Fiberglass Pipe Insulation:
 - 1. Acceptable manufacturers: Johns-Manville "Micro-Lok HP"; CertainTeed; Knauf; Owens Corning, Foster. Jacket: ASJ fiberglass reinforced Kraft paper with aluminum foil; minimum R value of 3.7 per inch of thickness.
 - 2. Use on the following services:
 - a. Domestic hot water supply piping (105 to 140 degrees F) - 1-1/4" and smaller-- 1" thick; 1-1/2" and larger--1-1/2" thick.
 - b. Domestic cold water piping indoors - 1/2" thick.
 - c. Domestic water piping in exterior walls - 1" thick.

2.02 MATERIALS FOR FITTINGS, VALVES, AND SPECIAL COVERINGS

- A. For all services, use premolded insulation for pipe fittings, elbows, tees, butterfly valves, and couplings 2-1/2 and larger. Finish shall be as specified under Products above or as specified below. PVC fitting covers with full thickness fiberglass inserts may be used on piping fittings elbows and valves 2" and less for the following services:
 - 1. Domestic Cold Water
 - 2. Domestic Hot Water

2.03 JACKETS

- A. Canvas Jacket: UL listed 6oz/sq. yd. plain weave cotton fabric treated with dilute fire retardant lagging adhesive compatible with insulation.
- B. Aluminum Jacket: ASTM B209 formed aluminum sheet of 0.016 inch, smooth finish with longitudinal slip joints and 2" laps, 0.016" thick die shaped fittings with factory attached protective liner. Adhere with 3/8" wide aluminum bands.
- C. PVC Jacket: One piece molded type fitting covers and sheet material, off-white in color, 15 mil thickness, 0.002 perm inch maximum in accordance with ASTM E96. Adhere with pressure sensitive color matching vinyl tape.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Deliver and store insulation materials in manufacturer's containers and keep free from dirt, water, chemical and mechanical damage.
- B. Complete piping pressure testing prior to applying insulation.
- C. Apply insulation in workmanlike manner by experienced and qualified workmen.
- D. Surfaces shall be clean and dry when covering is applied. Covering to be dry when installed and before and during application of any finish, unless such finish requires specifically a wetted surface for application.
- E. Adhesives, cements and mastics shall be compatible with materials applied and shall not attack materials in either wet or dry state..

3.02 INSTALLATION OF PIPE AND EQUIPMENT COVERING

- A. Where glass fiber or flexible tubular elastomeric insulation is used on piping sized 2" and larger, insert a section of foamglass or calcium silicate insulation, at hanger or support points, between pipe and metal shield for full length of shield, to prevent crushing of insulation. Where insulation passes through pipe hangers and across trapeze supports, 12" long metal saddles shall be used. Insulation thickness to be same as adjoining glass fiber insulation. On cold pipe, vapor barrier should be carried through the hanger and sealed. Saddles shall be used where rigid foamglass inserts are not acceptable.
- B. Finish on all piping exposed-to-the-weather shall be 0.016 inch thick, Childers, or equal, aluminum jacket on lines and Elljacs, or equal, pre-formed aluminum covering on fittings.

END OF SECTION

**SECTION 22 11 16
DOMESTIC WATER PIPING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Piping and pipe fittings for domestic cold and hot water piping.

1.02 RELATED REQUIREMENTS

- A. Section 220500 - Common Work Results For Plumbing
- B. Section 220553 - Identification for Plumbing Piping and Equipment
- C. Section 221119 - Domestic Water Piping Specialties

1.03 SUBMITTALS

- A. Submit product data for review on piping and fittings in accordance with the requirements of Division 01. Submittal data shall include:
 - 1. Manufacturer of pipe.
 - 2. Tests or listings by recognized testing laboratory that certifies material composition is in accordance with ANSI/ASTM requirements.
 - 3. Product data for pipe and fittings to be used on each piping system.

1.04 QUALITY ASSURANCE

- A. Lead Free: All wetted surface of pipe, fittings and fixtures in potable water systems shall have a weighted average lead content equal to or less than 0.25% per the Safe Drinking Water Act (Section 1417) as amended January 4, 2011.
- B. NSF Compliance: NSF/ANSI 61, NSF 61-G and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.
- C. Identify pipe with marking including size, ASTM material classification and specification and water pressure rating.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of the completed system.

1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. Ductile Iron Pipe: AWWA C151/A21.51.
 - 1. Fittings: Ductile or gray iron, standard thickness.
 - 2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch (19 mm) diameter rods.
- B. PE Pipe: ASTM D2239.
 - 1. Fittings: ASTM D2609, PE.
 - 2. Joints: Mechanical with stainless steel clamp.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

- A. CPVC PIPE AND FITTINGS
 - 1. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.
 - a. Fittings: CPVC; ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
 - b. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.
 - 2. For pipe and fittings 1/2" - 2": FlowGuard compound
 - 3. For pipe and fittings 2-1/2" and larger: Corzan compound

4. When CPVC is used, all installers must be trained by the manufacturer.
5. When CPVC is used, all materials to come into contact with CPVC must be deemed compatible for use with CPVC material. Examples include, but are not limited to fire stops, thread sealants, and leak detectors. Current information can be found on www.systemcompatible.com, or by contacting the manufacturer.
6. CPVC piping may be used for the following applications:
 - a. Domestic hot water
 - b. Domestic cold water
7. CPVC Fitting:
 - a. CTS fittings shall meet the requirements of ASTM D2846.
 - b. IPS Fittings shall meet or exceed the requirements of ASTM F437 (schedule 80 threaded) or ASTM F439 (schedule 80 socket). The CPVC compound used to produce the IPS fittings shall be pressure rated in accordance with ASTM D-2837 and PPI TR-3 having Hydrostatic Design Basis (HDB) of 400 psi at 72 degree F and 100 psi at 180 degree F as listed in PPI TR-4.
8. Solvent Cement for CPVC: All socket type joints shall be made employing solvent cement that meets or exceeds the requirements of ASTM F493 and primers that meet or exceed the requirements of ASTM F656. Safe handling of solvent cement shall be in accordance with ASTM F402. Solvent Cement and primer shall be listed by NSF International for use with potable water and approved for use by manufacturers.
 - a. Solvent cement joints for CTS systems may utilize two step solvent cement (orange or gray) with primer or one step solvent cement (yellow) with no primer. Use only Low VOC Solvent Cements.
 - b. Solvent cement joints for IPS systems must utilize two step solvent cement (orange or gray) with primer. Use only Low VOC solvent cement such as IPS Weld-On 724 for Corzan CPVC systems.
 - c. Corzan CPVC Flanges are available as transition / valve connections. Use one piece Corzan CPVC Flanges.
9. CPVC pipe and fittings approved manufacturers:
 - a. Lubrizol
 - b. IPEX
 - c. Spears
 - d. GF
 - e. Charlotte Pipe
 - f. Victaulic fittings
 - g. Nibco fittings
10. The Victaulic Company PGS-300 CPVC Piping system may be used on water and chemical services where IPS size Schedule 40 and 80 CPVC pipe is approved for use. Pipe and fittings shall be cut grooved to Victaulic's PGS-300 groove specification. Schedule 80 CPVC pipe shall meet the requirements of ASTM F441 and ASTM D1784 - minimum cell classification 23447 Pipe.
 - a. Couplings type: Victaulic Style 857 and Style 856. Consisting of two ductile iron housings conforming to ASTM A 536, Grade 65-45-12 cast with housing keys to join Victaulic PGS-300 grooved components, blue enamel. Couplings shall be provided with zinc-electroplated steel bolts and nuts conforming to ASTM A449 and ASTM A563/A563M. Gasket shall be Grade P Fluoroelastomer for water systems with operating temperatures to the limitation of the pipe, NSF-61 for potable water services.
 - b. Fittings: PGS-300 fittings meet the requirements of ASTM F439, modified for grooved ends. Fittings are supplied either directly molded to size with integral groove profile or are fabricated from socket fittings with factory solvent cemented grooved tangents. Classified in accordance with NSF-PW SE for potable water service.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Clean inside of pipe before installation. Keep installed piping clean and protect ends from foreign matter by capping or plugging them.
- C. Install pipe so that it does not interfere with opening of doors or apparatus, access to equipment, or to electrical equipment.
- D. Do not install pipes in such a way that they will apply torque to pumps. After pumps have been installed and pumps have been operated, recheck, and realign pumps if necessary.
- E. Run pipes in straight lines and square with building. Install risers plumb. Make offsets only where indicated and where necessary.
- F. Install branch connections using separate tee or lateral fittings for each branch. Do not combine branches into "bullhead tee" arrangement.
- G. Do not install water pipes in electric rooms, tele/data rooms, transformer rooms, audio/visual rooms, or elevator equipment rooms. Fire protection piping runouts serving only these rooms shall be installed in these rooms.
- H. Do not install piping above electrical equipment such as starters, panels, variable frequency motor controllers, motor control centers, or disconnects. Maintain code required clearance above, below and to sides of electrical equipment.
- I. Provide flanges or unions throughout the pipe systems at all equipment. Make provisions for servicing and removal of equipment without dismantling piping.
- J. Branch Lines:
 - 1. Where possible branch lines shall come off top of mains to prevent sediment, welding slag, or pipe deburrs from entering the branch lines and causing valve leakage or failure.
- K. Identify piping and systems in accordance with Section 22 05 53.

3.02 PIPE JOINTING

- A. Preparing Pipe Ends:
 - 1. Machine cut pipe ends square
 - 2. Ream pipe ends, after cutting, to full diameter
- B. Bracing Joints:
 - 1. Provide braces and bridle rods as required to reinforce joints.
 - 2. If mechanical couplings are used, then prepare pipe ends and make joints in accordance with pipe coupling manufacturer's printed instructions.
 - 3. Where large pipes underground are subject to shock because of sudden changes in liquid flow rate, provide concrete "kicker" blocks at joints, fittings, and changes of pipe direction. Provide "kicker" blocks in accordance with applicable pipe industry trade or research organization recommendations.
 - a. For example, for ductile iron pipe follow recommendations of Ductile Iron Pipe Research Association.

3.03 ESCUTCHEONS

- A. Provide chrome plated escutcheons where uninsulated pipes penetrate walls or ceilings of finished spaces.

3.04 STRAINERS

- A. Install strainers so the strainer basket can be removed without spilling water on motors and electrical equipment.

3.05 AIR VENTING

- A. Provide manually operated air vents at high points in vertical risers to eliminate air from systems.
- B. Use ball valves for manual air vents.

3.06 VALVE ACCESS

- A. Locate ceiling/wall access panels at shut-off and control valves for proper access and operation. Furnish and install access doors in accordance with Section 220500 and other

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Dyersburg, Tennessee**

Divisions as applicable.

3.07 TESTING

- A. Before piping is concealed or insulated, recheck it for leaks.
- B. Rework or replace defective and leaking joints, and joints which are otherwise unsatisfactory. Peening, caulking, and doping are not permitted.

END OF SECTION

SECTION 22 11 19
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes requirements for:
 - 1. Backflow preventers.
 - 2. Shock arrestors.
 - 3. Domestic water service connection.

1.02 RELATED REQUIREMENTS

- A. Section 220500 - Common Work Results For Plumbing
- B. Section 220523 - Valves For Plumbing Piping
- C. Section 220700 - Plumbing Insulation

1.03 QUALITY ASSURANCE

- A. Lead Free: All wetted surface of pipe, fittings and fixtures in potable water systems shall have a weighted average lead content equal to or less than 0.25% per the Safe Drinking Water Act (Section 1417) as amended January 4, 2011.
- B. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.04 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers are indicated in subsequent paragraphs.

2.02 BACKFLOW PREVENTERS

- A. Acceptable manufacturers:
 - 1. Beeco
 - 2. Apollo
 - 3. Febco
 - 4. Cla-Val
 - 5. Ames
 - 6. Watts
 - 7. Wilkins Regulator Company
- B. Provide completely automatic unit, fitted with tight closing shut-off valves and test cocks at each end.
- C. Construct such that all parts are replaceable without removing unit from line.
- D. Total pressure drop through complete backflow preventer does not exceed 12 PSI at rated flow.
- E. Provide per local requirements and dimensions as detailed on drawings.
- F. Backflow preventers shall meet the following standards: (Apollo Figure numbers are used for reference.)
 - 1. Atmospheric vacuum breaker - Apollo 38-200 series, ASSE 1001-2017
 - 2. Hose-connected vacuum breakers - Apollo 38-414, ASSE 1011-2017
 - 3. Back siphonage vacuum breakers - Apollo 4A-500-04F, ASSE 1056-2013
 - 4. Reduced pressure principle backflow preventers - Apollo 4ALF-200 Series, ASSE 1013-2011
 - 5. Pressure type vacuum breaker - ASSE-1020-2020

2.03 SHOCK ARRESTORS

- A. Acceptable manufacturers:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Josam
 2. Wade
 3. Jay R. Smith
 4. Precision Products
 5. Zurn
 6. Sioux Chief
- B. Arrestor shall be piston type, polycarbonate with two EPDM O-rings, lubricated with FDA-approved Dow Corning #111 silicone compound in Type L or K copper body, suitable for 200 psig minimum pressure at 200 degrees F.
- C. Arrestor shall be ANSI/ASSE 1010 Certified and be maintenance free with no access panel required.

2.04 DOMESTIC WATER SERVICE CONNECTION

- A. Provide tapping sleeve and valves for connection to existing water mains.
- B. Provide domestic water meters, gate valves, check valves, bypass feature, and meter pit per local utility company requirements and standards.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

- A. Shock Arrestors:
1. Install shock arrestors at each quick closing valve, solenoid type valve, and flush valve. Size shock arrestors in accordance with manufacturer's instructions.
 2. Install shock arrestors within five feet of valve, provide wall access panel as required.
 3. Test and certify shock arrestors by Plumbing and Drainage Institute in accordance with ANSI/ASSE 1010.
- B. Domestic Water Service Connection:
1. Arrange and coordinate with local utility company for service connection, meter type and manufacturer, fees, permits, etc.
 2. Field verify exact location, size, pressure, and elevation of existing water main.
 3. Flush system and test at 200 PSI for 24 hours without any leaks.

END OF SECTION

SECTION 22 11 19
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes requirements for:
 - 1. Backflow preventers.
 - 2. Shock arrestors.
 - 3. Domestic water service connection.
 - 4. Inline automatic flow controller.
 - 5. Thermometers and pressure gauges.
 - 6. Domestic Water expansion tank
 - 7. Thermostatic balance valve

1.02 RELATED REQUIREMENTS

- A. Section 22 05 00 - Common Work Results For Plumbing
- B. Section 22 05 23 - Valves For Plumbing Piping
- C. Section 22 07 00 - Plumbing Insulation

1.03 QUALITY ASSURANCE

- A. Lead Free: All wetted surface of pipe, fittings and fixtures in potable water systems shall have a weighted average lead content equal to or less than 0.25% per the Safe Drinking Water Act (Section 1417) as amended January 4, 2011.
- B. NSF Compliance: NSF/ANSI 61 and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.04 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers are indicated in subsequent paragraphs.

2.02 BACKFLOW PREVENTERS

- A. Acceptable manufacturers:
 - 1. Beeco
 - 2. Apollo
 - 3. Febco
 - 4. Cla-Val
 - 5. Ames
 - 6. Watts
 - 7. Wilkins Regulator Company
- B. Provide completely automatic unit, fitted with tight closing shut-off valves and test cocks at each end.
- C. Construct such that all parts are replaceable without removing unit from line.
- D. Total pressure drop through complete backflow preventer does not exceed 12 PSI at rated flow.
- E. Provide per local requirements and dimensions as detailed on drawings.
- F. Backflow preventers shall meet the following standards: (Apollo Figure numbers are used for reference.)
 - 1. Atmospheric vacuum breaker - Apollo 38-200 series, ASSE 1001-2017
 - 2. Hose-connected vacuum breakers - Apollo 38-414, ASSE 1011-2017
 - 3. Back siphonage vacuum breakers - Apollo 4A-500-04F, ASSE 1056-2013

4. Reduced pressure principle backflow preventers - Apollo 4ALF-200 Series, ASSE 1013-2011
5. Double check valve assembly - Apollo 4ALF-100 Series, ASSE 1015-2011
6. Pressure type vacuum breaker - ASSE-1020-2020

2.03 SHOCK ARRESTORS

- A. Acceptable manufacturers:
 1. Josam
 2. Wade
 3. Jay R. Smith
 4. Precision Products
 5. Zurn
 6. Sioux Chief
- B. Arrestor shall be piston type, polycarbonate with two EPDM O-rings, lubricated with FDA-approved Dow Corning #111 silicone compound in Type L or K copper body, suitable for 200 psig minimum pressure at 200 degrees F.
- C. Arrestor shall be ANSI/ASSE 1010 Certified and be maintenance free with no access panel required.

2.04 THERMOMETERS AND PRESSURE GAUGES

- A. Acceptable manufacturers: Tterice, Winters, Dwyer or approved equal.
- B. Thermometers shall have a 9" aluminum case with 3.5" or 6" stem, fully adjustable, organic filled (non-mercury), +/- 1% accuracy, lead free brass or stainless steel thermowell, dual scale, 30 degrees F to 200 degrees F range.
- C. Pressure gauges shall have a 4" white aluminum dial with type 304 SS case, lead free brass socket, glycerin filled with accuracy of +/- 1.5 % of full scale to 150 degrees F; dry type to 200 degrees F. Install with lead free gauge cock.

2.05 DOMESTIC WATER SERVICE CONNECTION

- A. Provide tapping sleeve and valves for connection to existing water mains.
- B. Provide domestic water meters, gate valves, check valves, bypass feature, and meter pit per local utility company requirements and standards.

2.06 MANUAL FLOW BALANCING VALVE

- A. Acceptable Manufacturers: Nibco, Armstrong 'CBV'; Taco; Tour & Andersson.
- B. Provide globe style valve, calibrated, lead free, brass or stainless steel body and disk, with provisions for connecting a portable differential pressure meter for flow measurement and balance. Nibco T-1810-LF or S-1810-LF or equal. Provide meter connections with built-in check valves.
- C. Provide integral pointer to register degree of valve opening with tamper proof locking memory feature.
- D. Provide valve with drain connection.
- E. Construct valve with integral sleeves to prevent leakage around rotating element.
- F. Construct valve for 125 psi working pressure at 260 degrees F.
- G. Provide preformed polyurethane insulation for easy access to valve without disturbing field applied adjacent insulation.
- H. Provide valve with engraved tag attached indicating design flow, pressure, and flow characteristic of station.

2.07 INLINE AUTOMATIC FLOW CONTROLLER

- A. Provide automatic flow controllers at recirculating branches and at recirculating pump as scheduled and detailed on Drawings.
- B. Acceptable manufacturers: FDI, Inc. Model ICCS.

- C. Body: Series 300 Stainless steel
- D. Union Nut: Nickel plated brass
- E. Flow Cartridge: Series 300 Stainless Steel wear surfaces
 - 1. Accuracy: Flow rate +/-5% over 95% of the control range
 - 2. Certification: NSF/ANSI 61-G certified by NSF for potable water applications
- F. Temperature rating: 180 degree F. Tested and approved for commercial hot water applications.
- G. Pressure rating: 400 PSI static pressure.
- H. Provide portable meter kit including the following accessories:
 - 1. Hoses, fittings and adapters as required for connection to pressure/temperature ports.
 - 2. 6" diameter face, 270 degree arc, beryllium diaphragm gauge.
 - 3. Provide with carrying case, calibration instructions and capacity curves.

2.08 DOMESTIC WATER EXPANSION TANK

- A. Acceptable Manufacturers:
 - 1. Amtrol Inc. - THERM-X-TROL
 - 2. Bell and Gossett Series PT
 - 3. Taco PAX Series
 - 4. Watts PLT Series
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1; rated for working pressure of 150 psig at 200 degrees F; stainless steel connectors; polypropylene liner; flexible FDA approved butyl/EPDM diaphragm or butyl bladder sealed into the tank; with steel legs, stand or saddles. Tank shall meet the requirements of NSF 61 for Lead Free construction and use. Designed for use in potable water systems.
- C. Accessories: Pressure gauge, air charging fitting and tank drain fitting. Precharge to 40 psig.
- D. Capacity: As noted on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

- A. Backflow Preventers:
 - 1. Pipe relief through fixed air gap and discharge to sewer.
 - 2. Install adjacent to wall and/or floor utilizing stand-off brackets, angle frame, and/or concrete piers.
 - 3. Test unit for leaks and pressure drop. Clean and/or replace soiled strainer media.
 - 4. Provide dual parallel reduced pressure backflow preventers on the main domestic water entrance to the facility.
 - 5. Provide a reduced pressure backflow preventer on the domestic hot and cold water lines feeding the laboratory and morgue.
 - 6. Provide a reduced pressure backflow preventer on the domestic cold water serving carbonators at soda machines.
 - 7. Provide backflow prevention vacuum breaker on any water line feeding any piece of equipment which could cause back siphonage such as mechanical equipment, trap primer lines, etc.
 - 8. Provide a double check valve backflow preventer on the fire main service to the building.
- B. Shock Arrestors:
 - 1. Install shock arrestors at each quick closing valve, solenoid type valve, and flush valve. Size shock arrestors in accordance with manufacturer's instructions.
 - 2. Install shock arrestors within five feet of valve, provide wall access panel as required.
 - 3. Test and certify shock arrestors by Plumbing and Drainage Institute in accordance with ANSI/ASSE 1010.
- C. Domestic Water Service Connection:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Arrange and coordinate with local utility company for service connection, meter type and manufacturer, fees, permits, etc.
 2. Field verify exact location, size, pressure, and elevation of existing water main.
 3. Flush system and test at 200 PSI for 24 hours without any leaks.
- D. Inline Automatic Flow Controllers:
1. Install in accordance with manufacturer's instructions and in accordance with details on Drawings.
 2. Provide valves, strainers and PT ports NSF approved for potable water systems.
- E. Expansion tanks:
1. Install in locations shown on the drawings and in accordance with the details and manufacturer's requirements.

END OF SECTION

SECTION 22 13 16
STORM AND SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste and vent piping

1.02 RELATED REQUIREMENTS

- A. Section 22 05 00 - Common Work Results For Plumbing
- B. Section 22 05 29 - Hangers for Plumbing Piping
- C. Section 22 13 19 - Sanitary Waste Piping Specialties

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- B. ASTM D 1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- C. ASTM D 2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
- D. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- E. ASTM D 3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- F. UL 723 - Tests for Surface Burning Characteristics of Building Materials

1.04 SUBMITTALS

- A. Submit product data for review on piping and fittings in accordance with the requirements of Division 01. Submittal data shall include:
 - 1. Manufacturer of pipe.
 - 2. Tests or listing by recognized testing laboratory that certifies material composition is in accordance with ANSI/ASTM requirements.
 - 3. Product data for pipe and fittings to be used on each piping system.
 - 4. Identification of where each pipe type will be used.

1.05 QUALITY ASSURANCE

- A. Identify pipe with marking including size, ASTM material classification and ASTM specification.

1.06 DELIVERY, STORAGE AND PROTECTION

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of the completed system.

PART 2 - PRODUCTS

2.01 PVC PIPE AND FITTINGS

- A. Polyvinyl chloride sewer pipe and fittings (4" to 15" diameters) shall be as manufactured by Charlotte Pipe and Foundry Company or equal.
- B. PVC piping and fittings shall be furnished by the same manufacturer.
- C. PVC joint cleaner and solvent cement shall be furnished by the same manufacturer.
- D. PVC Schedule 40, DWV, ASTM D 1784. Solvent cement shall meet ASTM D 2564 for (PVC-DWV) plastic and pipe fittings. If permitted by governing code authority, may be used for:
 - 1. Inside gravity, under floor slab sanitary and storm waste drainage systems, with waste temperatures below 140 degrees F.
- E. PVC Type-PSM, Sewer Main Pipe, ASTM D 3034, SDR 35 with gasketed slip type joints. Provide coupling with a rubber ring seal for use in each manhole entry to ensure a surface for adherence of concrete to manhole wall. If permitted by governing code authority, may be used

for:

1. Outside gravity, underground sanitary sewer drainage piping, from 5'-0" outside the building to the connection point to local municipality.

F. Fittings:

1. Permanently identify each fitting in accordance and manufacturer's trademark.
2. Include certification with submittal data that fittings and flanges meet applicable requirements and ASTM compliance designation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PVC Joints:

1. Make joints in accordance with cement manufacturer's printed instructions.

B. Bracing Joints:

1. Provide braces and all-thread bridle rods as required to reinforce storm piping joints 4" and larger at each change of direction within the building and where otherwise not direct buried below ground. Bracing and restraints shall be as detailed using socket clamps and bridle rods secured to the pipe entering and leaving the elbow fitting. HOLDRITE #117 Series No-Hub Fitting Restraints using galvanized straps with heavy-duty galvanized or black iron bolted clamps may be used for no-hub cast iron pipe. Stainless steel band clamps in lieu of black iron bolted clamps are not acceptable.
2. The bracing described above does not remove the requirement for four or six band no-hub couplings required elsewhere in these specifications.
3. If mechanical lock type couplings are used, then prepare pipe ends and make joints in accordance with pipe coupling manufacturer's printed instructions.
4. Where pipes 8" and larger underground are subject to shock because of sudden changes in liquid flow rate, provide concrete "kicker" blocks at joints, fittings, and changes of pipe direction. Provide "kicker" blocks in accordance with applicable pipe industry trade or research organization recommendations.

C. Clean inside of pipe before installation. Keep installed piping clean and protect ends from foreign matter by capping or plugging them.

D. Do not install piping above electrical equipment such as starters, panels, variable frequency motor controllers, motor control centers, or disconnects. Maintain code required clearance above, below and to sides of electrical equipment.

E. Run pipes in straight lines and square with building. Install risers plumb. Make offsets only where indicated and where necessary.

F. Piping passing through or under grade beams or through foundation walls shall be provided with a schedule 40 steel pipe sleeve two sizes greater than the piping passing through the sleeve.

G. Identify all storm, waste, and vent piping in accordance with and as specified in Section 22 05 53.

END OF SECTION

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes requirements for:
 - 1. Cleanouts
 - 2. Sanitary sewer service connection

1.02 RELATED REQUIREMENTS

- A. Section 220500 - Common Work Results For Plumbing
- B. Section 221116 - Domestic Water Piping
- C. Section 221316 - Storm And Sanitary Waste And Vent Piping

1.03 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers are indicated in subsequent paragraphs.

2.02 CLEANOUTS

- A. Acceptable manufacturers:
 - 1. Zurn (Zurn model numbers are used below)
 - 2. Josam
 - 3. Wade
 - 4. Jay R. Smith
 - 5. Sioux Chief
 - 6. Watts
- B. Exterior: Z1400Z heavy duty cast iron cleanout housing with internal cleanout body and plug.
- C. Finished concrete floor: ZN1400 cast iron body with round adjustable polished nickel bronze top, ABS plug and carpet marker where required.
- D. Ceramic tile: ZN1400 Series, cast iron body, polished nickel bronze top, 1/2" terrazzo recess and closure plug.
- E. Vinyl tile floor: ZN1400-X, cast iron body, round nickel bronze top, 1/8" tile recess and closure plug.
- F. Carpet: ZN1400-CM. Inside caulk round brass scoriated frame and cover and provide carpet marker.
- G. Wall: Z1446, cast iron caulking ferrule with round stainless access cover and screws.
- H. Access covers: Minimum size 12" x 12" located for access to valves, shock absorbers, trap primers, wall cleanouts, etc.
- I. Furnish cleanouts occurring in waterproof floors with clamping devices.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

- A. Cleanouts
 - 1. Provide line size cleanouts up to 4"; 4" cleanout for lines larger than 4".
 - 2. Locate cleanouts at all changes in direction greater than 45 degrees and in straight runs as shown 100 feet outside the building on drawing or spaced not greater than required by applicable Plumbing Code.
 - 3. Extend inaccessible cleanouts up through floor and/or wall to provide easy accessibility.
- B. Sanitary Sewer Service Connection

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Arrange and coordinate with local utility company for service connection, fees, permits, etc.
2. Field verify exact location, size, and elevation of existing sewer.
3. Flush system, fill with water and let stand with a minimum 10 feet of head for 24 hours without any leaks.

END OF SECTION

SECTION 22 33 36
WATER HEATER - ELECTRIC

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electric Tankless or Point-of-Use Water Heaters

1.02 RELATED REQUIREMENTS

- A. Section 220700 - Plumbing Insulation
- B. Section 221116 - Domestic Water Piping
- C. Division 26: Electrical

1.03 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01.
- B. Include performance, capacity and wiring diagrams for each heater type and size.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with a minimum of 10 years of experience.
- B. Performance: Ensure the products perform to the requirements, ratings and capacity of the equipment scheduled on the drawings.

PART 2 - PRODUCTS

2.01 ELECTRIC TANKLESS OR POINT OF USE WATER HEATERS

- A. Acceptable Manufacturers:
 - 1. A. O. Smith
 - 2. Stiebel Eltron
 - 3. Chronomite
 - 4. Eemax
 - 5. Rheem
- B. Equipment
 - 1. Standard: UL 499 for electric, tank-less domestic water heater
 - 2. Construction: Copper piping or tubing complying with NSF61 barrier materials for potable water, without storage capacity.
 - a. Connections: ASME B 1.20.1 pipe thread
 - b. Pressure Rating: 150 psi
 - c. Heating Element: Resistance heating element. Element shall be iron free, nickel-chrome or stainless steel material. Element shall be a replaceable without removing the unit from the wall.
 - d. Temperature Control:
 - 1) Digital control, quick response time for temperature variations
 - 2) Control tested to achieve temperature limit control requirements of UL 353.
 - e. Internal fusing for control and load circuits
 - f. Flow control device per manufacturer's requirements
 - g. Pressure and temperature gauges
 - h. Rated for 160 degrees F water temperature
 - 3. Safety Controls:
 - a. High temperature limit cut-off device or system
 - 4. Support: Bracket for wall mounting.
 - 5. Operating and maintenance instructions.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Verify location and clearance requirements.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- B. Install in accordance with manufacturer's recommendations and contract drawings.
- C. Insulation for water connections as specified in Section 220700 - Plumbing Insulation.
- D. Install electric connections under and in accordance with Division 26.
- E. Clean and test unit as required by Sections 220500 - Common Work Results For Plumbing.
Record results and deliver as part of the project closing file.

END OF SECTION

**SECTION 22 40 00
PLUMBING FIXTURES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Compliance with the provisions of Section 22 05 00 - Common Work Results For Plumbing.
- B. Plumbing fixtures, trim and related items such as supplies, traps, drains, cleanouts, water closet flanges, bolts, seats and covers, fixture supports and other accessory items.
- C. Coordination of fixture requirements by reviewing architectural, structural, and equipment drawings. Install fixtures in accordance with Contract Drawings and manufacturer's rough-in drawings.
- D. Installation of water tempering devices at all public lavatories and similar hand washing fixtures and elsewhere noted on the drawings.

1.02 RELATED REQUIREMENTS

- A. Section 22 13 19 - Sanitary Waste Piping Specialties
- B. Section 22 11 16 - Domestic Water Piping
- C. Section 22 05 23 - Valves for Plumbing Piping

1.03 REFERENCE STANDARDS

- A. Perform work in accordance with applicable codes and standards enforced by local authorities.
- B. All barrier free fixtures shall be installed in accordance with the Americans with Disabilities Act (ADA) Rules and Regulations.

1.04 SUBMITTALS

- A. Submit manufacturer's product data: fixtures; fittings; accessories; and supplies for review in accordance with Division 01 requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with a minimum of five years of documented experience.
- B. Products requiring electrical connections must be UL or ETL listed and classified suitable for the purpose specified.
- C. All fixtures, faucets, trim and accessories must be protected from damage at all times including after installation to prevent unauthorized use.
- D. All wetted surfaces of faucets, mixing valves, isolation valves, balancing valves and shower valves in potable water systems must be lead free and ASSE 1070 and NSF 61 Certified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Fixture stops, supplies, faucets, mixing valves, shock absorbers or any devices in the drinking water supply shall be lead free per the "Safe Drinking Water Act."
- B. Brass Trim: McGuire, Engineered Brass Company, Kohler, Cambridge Brass, ProFLo.
- C. Shock Absorbers and P-Traps: Jay R. Smith, Zurn, Wade, Josam, Watts, MIFAB.
- D. Flush Valves: Sloan Royal, Zurn Z-6000-AV with low force handles for ADA compliance.
- E. Provide fixtures and trim as a complete unit as required in the individual "P" numbers listed on the drawings.

2.02 MATERIALS

- A. Fixture Color: White unless specified otherwise.
- B. Faucets and Flush Valves: Provide either integral or attached supply stops with nipples.

- C. Provide mixing valves per ASSE or CSA Standards as required by the local adopted code. Mixing valves used in drinking water shall be lead free. Mixing valves shall be used to supply tempered water to public hand-washing facilities and shall conform to ASSE 1070 or CSA B125.3.
- D. Caulking: General Electric silicon sanitary sealant or equal. Color to match fixture color.
- E. Provide FRT wood or metal backing at wall fixtures and fixture trim connections so piping and connecting faucets and valves are rigid to wall.
- F. All fixtures and fittings relating to drinking water shall meet the requirement of ANSI/NSF 61, Section 9. Any faucet for drinking water shall be certified by U.L. to the ANSI/NSF 61, Section 9 standards.

2.03 PLUMBING FIXTURES

- A. Plumbing fixtures shall be as scheduled on the drawings. See plumbing fixture schedule for description and accessories.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Connect to plumbing fixtures and equipment provided under this and other sections of specification, architectural drawings, and manufacturer's shop drawings. Provide rough-in connections as shown on drawings.
- B. Use schedule and details on drawings and/or manufacturer's shop drawings for connection sizes to fixtures.
- C. Provide separate p-trap for each fixture, floor drain, and piece of equipment.
- D. Install barrier free fixtures in accordance with rules and regulations of the Americans with Disabilities Act (ADA).
- E. Provide outlet devices which limit hot water flow to lavatories and sinks to a maximum of 0.5 GPM, sized as recommended by manufacturer and as required by ASHRAE 90.1 and state and local energy codes.
- F. Install lavatories and sinks with a minimum of 4" clearance on each side, from a wall or partition. Refer to architect drawings for additional information.
- G. Install water closets with a minimum of 15" clearance from the centerline of the bowl to each side, from a wall, partition, divider, or another fixture. Refer to architect drawings for additional information.
- H. Water closets shall have a minimum of 21" clearance in front of bowl. Refer to architect drawings for additional information.
- I. Coordinate dimensions required for minimum fixture clearances with other Divisions.
- J. Provide check valves on hot and cold water supply, on janitor sink faucet or any mixing faucet not equipped with integral check valve.
- K. Caulk around joints at fixtures mounted on wall or floor, or backed up to walls.
- L. Mount fixtures rigid to walls as shown on drawings or details.
- M. Flush valves: Install flush valves on wide side of water closet stall as required for ADA accessibility. Install water closet flush valves no higher than 44" above finished floor. Flush valve handles for urinals shall be mounted between 28" and 44" above finished floor. Refer to architect drawings for additional information. Refer to architect drawings for additional information.

3.02 TESTING AND CLEANING

- A. Inspect and test all work to insure that it is installed in accordance with the drawings, specifications and manufacturer's requirements and is functioning as designed and required. Use test procedures and pressures as required under this Division.
- B. Correct all deficiencies found and retest.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

C. Turn all work over to Owner in a clean, sanitary condition.

END OF SECTION

SECTION 22 46 00
SECURITY PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Manual flushometer.
- C. Lavatories.
- D. Fixture supports (carriers).
- E. Faucets, supplies, and trim.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. ASME A112.18.1 - Plumbing Supply Fittings.
- C. ASME A112.18.2 - Plumbing Waste Fittings.
- D. ASME A112.18.6 - Flexible Water Connectors.
- E. ASME A112.19.3 - Stainless Steel Plumbing Fixtures.
- F. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices.
- G. NSF 61 - Drinking Water System Components - Health Effects.
- H. NSF 372 - Drinking Water System Components - Lead Content.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specialized in manufacturing of product types specified in this section with minimum of three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inspect received fixtures for damages and keep fixtures in respective factory packaging.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 - PRODUCTS

2.01 WATER CLOSETS

- A. Configuration: Floor mounted single piece with siphon jet flush, trap and floor-outlet.
- B. Material: Seamless welded 304 stainless steel with elongated opening.
- C. Flush Capacity: High-efficiency (HET, WaterSense Certified) at 1.28 gallons (4.84 liters) at 25 psi (1.7 bar).
- D. Seat Type and Rim Height: Handicap-ADA compliant, 18 inches (45.7 cm), contoured.
- E. Exposed Surface Finish: Polished to satin finish.
- F. Maximum Load Capacity: 5,000 lbs (2,268 kg) without permanent deflection and damage.

2.02 MANUAL FLUSHOMETER

- A. Diaphragm operated valve assembly with spud flange, wall flange, terminating fittings, angle stop and screwdriver stop.
- B. Configuration: Exposed (top spud coupling) with wall flange.
- C. Flush Capacity: Match selected water closet rate.

- D. Materials: Chrome, plated with chloramine resistant rubber parts.

2.03 LAVATORIES

- A. Manufacturers:
- B. Wall mounted, 18 inch (45.7 cm) wide oval basin, tamper-resistant removable bottom (concealed) faucet supply and trap to wall waste outlet connections.
- C. Faucet Type: Single temperature, single fixture valve.
- D. Water Faucet Inlet Size: 3/8 inch (9.5 mm), concealed.
- E. Drain Outlet Size: 1-1/4 inch (31.7 mm) NPT with multi-hole integral drain.
- F. Material: Seamless welded 304 stainless steel polished to a smooth finish.
- G. Flow Capacity: Metered, 0.25 gallons per cycle (0.95 liters per cycle) at 60 psi (4.1 bar).
- H. Provide sensor-operated faucet matching listed flow rate.

2.04 FAUCETS, SUPPLIES, AND TRIM

- A. Manufacturers:
1. Behavioral Safety Products; _____: besafeprod.com/#sle.
 2. Chicago Faucet Company; _____: www.chicagofaucets.com/#sle.
 3. Delta Faucet Company; _____: www.deltafaucet.com/#sle.
 4. I-CON Systems, Inc; _____: www.i-con.com/#sle.
 5. Whitehall Manufacturing, Inc; _____: www.whitehallmfg.com/#sle.
 6. _____.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Potable Water Service: Provide faucets, pipe, tubing, and fittings in compliance with NSF 61 and NSF 372 for maximum lead content. Label pipe, fittings, and tubing.
- C. Water Efficiency Certification: Products to have affixed EPA WaterSense compliance label.
- D. Lavatory Service:
1. Sensor Operated:
 - a. Configuration: Deck serviceable, vandal-resistant with spray-stream pattern.
 - b. Sensor Type: Long-range single infrared beam.
 - c. Water Flow Capacity: 0.50 gpm (1.9 lpm) with built-in aerator.
 - d. Tempered Water Flow Control: Tempered.
 - 1) Run Time: Valve opens from 10 to 60 seconds to adjustable limit stop.
 - 2) Turn-off delay and stationary object automatic timed cutoff, with battery diagnostic light.
 - e. Material: Polished chrome solid cast brass for valve and trim or escutcheons.
 - f. Solenoid Valve:
 - 1) ASSE 1070, rough brass, surface-mounted thermostatic mixing type with strainer, inlet-side check valve, and flexible stainless steel connectors.
 - 2) Operating Pressure: 20 to 80 psi (1.38 to 5.52 bars).
 - 3) Operating Temperature: 40 to 140 degree F (4.4 to 60 degree C).
 - 4) Inlet: 3/8 inch (9.5 mm) NPTF with integral check valves.
 - 5) Power: 120 VAC to 24 VAC power supply operated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power at device-listed rating is available to connect control products. Then wire and terminate in per Section 26 05 83 requirements.

3.02 PREPARATION

- A. Set fixture-height in accordance with manufacturer recommendations otherwise apply the values listed within section schedule per particular fixture.

- B. Set fixture rough-in piping connection sizes in accordance manufacturer recommendations otherwise apply minimum values per service listed within section schedule per particular fixture.

3.03 REGULATORY REQUIREMENTS

- A. Perform work in accordance with local health department regulations.

3.04 INSTALLATION

- A. Provide fixture rough-in's with interconnecting fittings per Section 22 10 05 requirements.
- B. Provide supply fittings per fixture type as recommended in ASME A112.18.1.
- C. Provide waste fittings per fixture type as recommended in ASME A112.18.2.
- D. Provide flexible supply connectors per lavatory as recommended in ASME A112.18.6.
- E. Install fixtures and fittings in accordance with the manufacturer's instructions.
- F. Caulk fixtures and accessories per manufacturer instructions.
- G. Install flushometer and faucets at prescribed heights in compliance with ADA Standards.
- H. Install, level, and secure fixtures in place with wall supports, and bolts.
- I. Install fixture valves, traps, and related service components at reasonable locations free of limited space or obstructions to ensure easy removal for servicing and cleaning.
- J. Install components, level, and plumb each fixture utility service component.

3.05 CLEANING

- A. Thoroughly clean plumbing fixtures and equipment both internally and externally.

3.06 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace products damaged prior to issuing Certificate of Substantial Completion.

END OF SECTION

SECTION 23 01 30.51
HVAC AIR-DISTRIBUTION SYSTEM CLEANING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of HVAC duct system, equipment, and related components.
- B. Testing and inspection agency employed by Owner.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Additional requirements for testing and inspection agencies.
- B. Section 01 57 19 - Temporary Environmental Controls.

1.03 DEFINITIONS

- A. HVAC System: For purposes of this section, the surfaces to be cleaned include all interior surfaces of the heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system, including the inside of air distribution equipment, diffusers, grilles, registers, coils, and condensate drain pans; see NADCA ACR for more details.

1.04 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. NADCA ACR - Assessment, Cleaning and Restoration of HVAC Systems.
- C. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.
- D. UL 181A - Closure Systems for Use with Rigid Air Ducts.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Project Cleanliness Evaluation and Cleaning Plan, as specified.
- C. Project Closeout Report: Include field quality control reports, evidence of satisfactory cleaning, and documentation of items needing further repair.

1.06 QUALITY ASSURANCE

- A. Information Available to Contractor: No existing system documentation is available.
- B. Cleaning Contractor Qualifications: Company specializing in the cleaning and restoration of HVAC systems as specified in this section.
 - 1. Certified by one of the following:
 - a. NADCA, National Air Duct Cleaners Association: www.nadca.com
 - 2. Having minimum of three years documented experience.
 - 3. Employing for this project a supervisor certified as an Air Systems Cleaning Specialist by NADCA.

PART 2 - PRODUCTS

2.01 TOOLS AND EQUIPMENT

- A. Vacuum Devices and Other Tools: Exceptionally clean, in good working order, and sealed when brought into the facility.
- B. Vacuum Devices That Exhaust Air Inside Building, Including Hand-Held and Wet Vacuums: Equipped with HEPA filtration with 99.97 percent collection efficiency for minimum 0.3-micron size particles and DOP test number.
- C. Vacuum Devices That Exhaust Air Outside Building, Including Truck- and Trailer-Mounted Types: Equipped with particulate collection including adequate filtration to contain debris removed from the HVAC system; exhausted in manner that prevents contaminant re-entry to building; compliant with applicable regulations as to outdoor environmental contamination.

2.02 REPLACEMENT PRODUCTS

- A. Fibrous Glass Insulation: Provide material complying with UL 181 equivalent to existing material in quality and thickness.

2.03 SURFACE TREATMENTS

- A. Anti-Microbial Materials: EPA registered specifically for use on non-porous HVAC system surfaces and applied per manufacturer's instructions.
- B. Surface Coating for Fibrous Glass Materials: Water-based, zero VOC; flame spread index less than 25, smoke developed index less than 450, Class A, when tested in accordance with ASTM E84.

PART 3 - EXECUTION

3.01 PROJECT CONDITIONS

- A. Comply with applicable federal, state, and local requirements.
- B. Perform cleaning, inspection, and remediation in accordance with the recommendations of NADCA "Assessment, Cleaning and Restoration of HVAC Systems" (ACR) and as specified herein.
- C. Where NADCA ACR uses the terms "recommended", "highly recommended", or "ideally" in regard to a certain procedure or activity, do that unless it is clearly inapplicable to the project.
- D. Follow Owner's Infection Control Risk Assessment (ICRA) Plan.
- E. Take precautions to prevent introduction of additional hazards into occupied spaces.
- F. Comply with requirements of Division 1.
- G. Obtain Owner's approval of proposed temporary locations for large equipment.
- H. Designate a decontamination area and obtain Owner's approval.
- I. When portions of the facility are to remain occupied or in operation during cleaning activities, provide adequate controls or containment to prevent access to spaces being cleaned by unauthorized persons and provide detailed instructions to Owner as to these controls or containment.
- J. If unforeseen mold or other biological contamination is encountered, notify Architect immediately, identifying areas affected and extent and type of contamination.

3.02 EXAMINATION

- A. Prior to the commencement of any cleaning work, prepare and submit to Architect a project evaluation and plan for this project, including considerations recommended in NADCA ACR.
- B. Coordinate cleaning plan with indoor air quality control plan specified in Division 1, if available.
- C. Inspect the system as required to determine appropriate methods, tools, equipment, and protection.
- D. Start of cleaning work constitutes acceptance of existing conditions.
- E. When concealed spaces are later made accessible, examine and document interior conditions prior to beginning cleaning.
- F. Document all instances of mold growth, rodent droppings, other biological hazards, and damaged system components.

3.03 PREPARATION

- A. When cleaning work might adversely affect life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with authorities having jurisdiction.
- B. Ensure that electrical components that might be adversely affected by cleaning are de-energized, locked out, and protected prior to beginning work.
- C. Air-Volume Control Devices: Mark the original position of dampers and other air-directional mechanical devices inside the HVAC system prior to starting cleaning. Coordinate pre-balance

readings with test and balance contractor as applicable.

- D. Access to Concealed Spaces: Use existing service openings and make additional service openings as required to accomplish cleaning and inspection.
 - 1. Do not cut openings in non-HVAC components without obtaining the prior approval of Owner.
 - 2. Make new openings in HVAC components in accordance with NADCA Standard 05; do not compromise the structural integrity of the system.
 - 3. Do not cut service openings into flexible duct; disconnect at ends for cleaning and inspection.
- E. Ceiling Tile: Lay-in ceiling tile may be removed to gain access to HVAC systems during the cleaning process; protect tile from damage and reinstall upon completion; replace damaged tile.

3.04 CLEANING

- A. Use any cleaning method recommended by NADCA ACR unless otherwise specified; do not use methods prohibited by NADCA ACR, or that will damage HVAC components or other work, or that will significantly alter the integrity of the system.
- B. Obtain Owner's approval before using wet cleaning methods; ensure that drainage is adequate before beginning.
- C. Ducts: Mechanically clean all portions of ducts.
- D. Hoses, Cables, and Extension Rods: Clean using suitable sanitary damp wipes at the time they are being removed or withdrawn from their normal position.
- E. Registers, Diffusers, and Grilles: When removing, take care to prevent containment exposure due to accumulated debris.
- F. Coils: Follow NADCA ACR completely including measuring static pressure drop before and after cleaning; do not remove coils from system to clean; report coils that are permanently impacted.
- G. Fibrous Glass Material: Use HEPA vacuuming equipment, under constant negative pressure, do not permit to get wet, and do not damage surfaces; replace material damaged by cleaning operations.
- H. Existing Damaged Fibrous Glass Material: Report to Architect all evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture that cannot be remedied by cleaning or resurfacing with an acceptable insulation repair coating.
 - 1. Material with active fungal growth is considered irremediable.
 - 2. Remove irremediable material and clean underlying surfaces.
 - 3. Where surface damage can be repaired by applying a coating, do so at no extra cost to Owner.
 - 4. Replace irremediable material.
- I. Collect debris removed during cleaning; ensure that debris is not dispersed outside the HVAC system during the cleaning process.
- J. Store contaminated tools and equipment in polyethylene bags until cleaned in the designated decontamination area.

3.05 REPAIR

- A. Repair openings cut in the ventilation system so that they do not significantly alter the airflow or adversely impact the facility's indoor air quality.
- B. At insulated ducts and components, accomplish repairs in such a manner as to achieve the equivalent thermal value.
- C. Reseal new openings in accordance with NADCA Standard 05.
- D. Reseal rigid fiber glass duct systems using closure techniques that comply with UL 181 or UL 181A.
- E. When new openings are intended to be capable of being re-opened in the future, clearly mark them and report their locations to Owner in project report documents.

3.06 FIELD QUALITY CONTROL

- A. Ensure that the following field quality control activities are completed prior to application of any treatments or coatings and prior to returning HVAC system to normal operation.
- B. Visually inspect all portions of the cleaned components; if not visibly clean as defined in NADCA ACR, re-clean and reinspect.
- C. Coils: Cleaning must restore the coil pressure drop to within 10 percent of the coil's original installed pressure drop; if original pressure drop is not known, coil will be considered clean if free of foreign matter and chemical residue based on visual inspection.
- D. Notify Architect when cleaned components are ready for inspection.
- E. Notify Owner's testing and inspection agency when cleaned components are ready for inspection.
- F. Owner reserves the right to verify cleanliness using NADCA ACR Surface Comparison Testing or NADCA Vacuum Test.
- G. When directed, re-clean components until they pass.
- H. Contractor shall bear the costs of retesting due to inadequate cleaning.
- I. Submit evidence that all portions of the system required to be cleaned have been cleaned satisfactorily.

3.07 ANTI-MICROBIAL TREATMENT

- A. When directed, apply anti-microbial treatment to internal surfaces.
- B. Apply anti-microbial agent after removal of surface deposits and debris.
- C. Apply anti-microbial treatments and coatings in strict accordance with the manufacturer's written recommendations and EPA registration listing.
- D. Spray coatings directly onto interior ductwork surfaces; do not "fog" into air stream.

3.08 ADJUSTING

- A. After satisfactory completion of field quality control activities, restore adjustable devices to original settings, including, but not limited to, dampers, air directional devices, valves, fuses, and circuit breakers.
- B. Coordinate testing and re-balancing of existing systems with test and balance contractor.

3.09 WASTE MANAGEMENT

- A. Double-bag waste and debris in 6 mil, 0.006 inch (0.1524 mm) thick polyethylene plastic bags.
- B. Dispose of debris off-site in accordance with applicable federal, state and local requirements.

END OF SECTION

**SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Common work results for requirements specifically applicable to Division 23.
- B. Requirements of Division 01 Specifications, General Provisions of the Contract and General and Supplementary Conditions apply to this Division.

1.02 REGULATORY REQUIREMENTS

- A. Perform Work specified in Division 23 in accordance with standards listed below of the latest applicable edition adopted by the authority having jurisdiction. Where these Specifications are more stringent, they shall take precedence. In case of conflict, obtain a decision from the Architect.
 - 1. NFPA 70: National Electrical Code
 - 2. NFPA 72: National Fire Alarm and Signaling Code
 - 3. NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems
 - 4. NFPA 90B: Standard for the Installation of Warm Air Heating and Air Conditioning Systems
 - 5. NFPA 101: Life Safety Code
 - 6. NFPA 101A: Guide on Alternative Approaches to Life Safety
 - 7. NFPA 5000: Building Construction and Safety Code
 - 8. ANSI Handicapped Code-A117.1
 - 9. All applicable Occupational Safety and Health Administration (OSHA) Publications, Rules, and Regulations.
 - 10. Americans with Disabilities Act (ADA)
 - 11. Special regulations, supplement, and amendments of the State and/or local authorities having jurisdiction.

1.03 REFERENCE STANDARDS

- A. ANSI: American National Standards Institute.
- B. ARI: American Refrigeration Institute.
- C. ASHRAE: American Society of Heating Refrigeration and Air Conditioning Engineers.
- D. ASME: American Society for Mechanical Engineers.
- E. ASTM: American Society for Testing and Materials.
- F. AWWA: American Water Works Association.
- G. FM: Factory Mutual
- H. IRI: Industrial Risk Insurers
- I. MSS: Manufacturer's Standardization Society of the Valve and Fitting Industry.
- J. NEMA: National Electrical Manufacturers' Association.
- K. NFPA: National Fire Protection Association.
- L. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.
- M. UL: Underwriters' Laboratories, Inc.
- N. U.L. Fire Resistance Index

1.04 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Incomplete submittals containing unmarked cutsheets or not providing specific detail of what is being proposed will be rejected and will not be reviewed.
- C. Include Products as specified in the individual sections of Division 23.

- D. Submit shop drawing and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- E. Prepare shop drawings completely independent of the Engineer of Record's CADD files or Revit model. Should the Contractor or Vendor wish to use the Engineer of Record's CADD files or Revit model as the basis for developing their shop drawings, a release form, obtainable from the Engineer or Architect, must be signed. A nominal charge of \$50.00 per sheet must be made payable to the engineering firm to cover the cost of preparing the drawings for use by others.
- F. Brochures: Submit manufacturer's product data and brochures including:
 - 1. Complete descriptions.
 - 2. Illustrations.
 - 3. Rating data, accessories, dimensional data, and applicable options and features marked for the specific items scheduled on drawings and specified herein.
 - 4. Capacities stated in the terms specified.
 - 5. Performance curves for all air handling units, fans, and pumps.

1.05 FIELD CONDITIONS

- A. Layouts indicated on drawings are diagrammatic and intended to show relative positions and arrangement of equipment, ductwork, and piping. Coordinate mechanical work with other trades and measurements obtained at the job site, as applicable, prior to installation. Generally, install work in locations shown on Drawings, using as necessary rises, drops, offsets, transitions, and alternate routings to fit in the available space unless prevented by Project conditions.
- B. If prevented by project conditions, prepare drawings showing proposed rearrangement of Work, including changes to Work specified in other sections. Obtain permission of Architect before proceeding.
- C. Place anchors, sleeves, and supports prior to pouring concrete or installation of masonry work.
- D. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner, authorities having jurisdiction, and all affected trades.
- E. Determine sizes and verify locations of existing utilities on or near site.
- F. Keep roads clear of materials and debris.
- G. Visit site and be informed of conditions under which Work must be performed.
- H. Locate equipment requiring periodic servicing so that it is readily accessible. Provide means of service access, following appropriate manufacturer's recommended service clearance space or, as applicable, means of access using duct, wall, or ceiling access doors.
- I. Install ductwork and piping to leave sufficient space for AHJ inspection of wall construction.

1.06 FEES AND PERMITS

- A. Obtain and pay for all necessary permits and inspection fees required to perform Division 23 work.

1.07 COORDINATION DRAWINGS

- A. Prior to commencement of installation, prepare coordination drawings for work under this division, as specified in Division 01, in full cooperation with persons performing work under other Divisions, including but not limited to mechanical, electrical, plumbing, fire protection, telecommunications, audio/visual and miscellaneous steel.
- B. Drawings shall not be formally submitted but shall be kept on site for reference. Notify Architect and Construction Manager of conflicts that cannot be resolved.
- C. Coordination Drawings shall be prepared to include the following:
 - 1. Drawn to a scale of 1/4" = 1'-0".
 - 2. Room dimensions.
 - 3. Sheet size matching contract documents.
 - 4. Duct sizes with bottom elevation from finished floor.

5. Show equipment, columns, and beams.
6. Duct fitting details.
7. Concrete pad and foundation layouts including anchor bolt and sleeve locations.
8. Wall mounted equipment.
9. Piping 3" and larger, with elevations from finished floor to bottom of pipe.
10. Space allocation for conduits and cable trays.
11. Ceiling height.
12. Ductwork, air terminal units, and piping 3" and larger shall be shown in proper graphic scale.
13. Clearance requirements for control panels, inspections, and maintenance.
14. Coordination drawings are to indicate air terminal units, fan coil units, air handling units, control panels, and all other devices and materials to proper scale.

1.08 COMPLETENESS OF WORK

- A. The Contract Documents depict HVAC systems which are intended to be complete and functioning systems. All products, materials, and labor necessary to render a fully functional system to fulfill the design intent shown on the documents shall be provided by the Contractor.
- B. Catalog numbers referenced throughout the Division 23 Drawings and Specifications are intended to convey a general understanding of the type and quality of the product required. Where written descriptions differ from information conveyed by a catalog number, the written description shall govern. No extra shall be allowed because a catalog number is found to be incomplete or obsolete.

1.09 PRODUCT SUBSTITUTIONS

- A. Comply with provisions of Division 01.

1.10 RECORD DRAWINGS

- A. Provide record drawings that illustrate the work of Division 23 as finally constructed. Deliver record drawings to the Architect in a form suitable for reproduction.
- B. Record drawings shall reflect all changes made to the Contract Documents, whether generated by addenda, change orders, or field conditions. Maintain a daily record of these changes and keep current set of drawings showing these changes.

1.11 OWNING AND OPERATING MANUALS

- A. Manuals shall include clear and comprehensive instructions with appropriate graphics and project specific marked data to enable owner to operate and maintain all systems specified in this Division.
- B. Copies of final reviewed submittals indicating all model numbers, serial numbers, cut sheets, and all performance criteria on furnished equipment shall be included.

PART 2 - PRODUCTS

2.01 EQUIPMENT SUPPORTS

- A. Structural Steel for Supports: ASTM A36.
 1. Use galvanized members installed in fan plenums or areas of high humidity or condensation, and outside. All fasteners shall be stainless steel. Any damage caused by cutting, drilling, or welding or any other means to galvanized surface must be repaired by apply two coats of cold-galvanizing.
 2. Use hot dipped galvanized members installed in fan plenums or areas of high humidity or condensation, in tunnels and outside. All fasteners shall be stainless steel. Any damage caused by cutting, drilling, or welding or any other means to galvanized surface must be repaired by applying two coats of cold-galvanizing.
 3. Furnish other members with shop coat of primer.
 4. Retouch primer after field welding.

PART 3 - EXECUTION

3.01 CUTTING AND PATCHING

- A. Repair or replace damage caused by cutting or installation of work specified in Division 23.
- B. Perform repairs with materials which match existing and install in accordance with the appropriate section of these specifications.

3.02 DELIVERY, STORAGE, AND PROTECTION

- A. Insofar as possible, deliver items in manufacturer's original unopened packaging. Where deliver in original packaging is not practical, provide cover and shielding for all items with protective materials to keep them from being damaged. Use care in loading, transporting, unloading, and storing to keep items from being damaged.
- B. Store items in a clean, dry place, and protect from damage. Mechanical equipment may not be staged or stored outdoors unless intended for outdoor use.
- C. Protect nameplates on motors, pumps, and similar equipment. Do not paint or insulate over nameplate data.
- D. Keep dirt and debris out of pipes and ducts.
- E. Repair, restore, and replace damaged items.

3.03 CLEANING HVAC SYSTEMS

- A. General Cleanup:
 - 1. Upon completion of contract and progressively as work proceeds, clean up dirt, debris, old materials, etc., and remove from site, keeping premises in neat and clean condition to satisfaction of the Architect. See Division 01 of specifications for further requirements.
 - 2. Seepage, discoloration, or other damage to parts of the building, its finish, or furnishings due to Contractor's failure to properly clean piping systems or duct systems shall be repaired without cost to the Owner.
- B. Factory Finishes:
 - 1. Clean items with factory finishes. Touch up bare places, scratches, and other minor damage to finishes. Use only factory supplied paint of matching color and formula. If finishes are badly damaged or if there are many damaged, scratched, or bare places, refinish the entire item.
- C. Ducts and Apparatus:
 - 1. Thoroughly clean ducts and apparatus casings before fans and filters are operated.

3.04 OPERATION OF HVAC SYSTEMS DURING CONSTRUCTION

- A. Install all specified filters prior to system operation. In addition to specified filters, install a roughing filter upstream of mixed air filter. Roughing filter shall consist of two layers of roll filter media clipped and sealed to entering side of filter frame. Change roughing filter as necessary to minimize dust collection on specified filters.
- B. Cover return and exhaust air grilles with temporary filter media. Attach media to avoid damage to grille or ceiling. Change temporary media as required to protect against dust buildup on ductwork. Remove temporary media from grilles after flooring is installed, walls are sanded and painted and other dust generating construction has been completed.
- C. During periods of excessive dust generation such as drywall sanding, seal off return and exhaust openings and grilles to prevent dust from accumulating in ductwork.
- D. If outside air source contains less dust than building air, adjust A/C unit dampers to operate with as much outside air as possible without causing a freezing condition for coil or exceeding capacity of coil to adequately condition supply air.
- E. Furnish and install a new set of specified filter media prior to start of system test and balance. Furnish a new, clean set of the specified media and turn over to Owner's Representative.

3.05 TESTING MECHANICAL SYSTEMS

- A. Test all systems and equipment installed to demonstrate proper operation.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

- B. Advise Architect of scheduled systems testing and completed system demonstration/operation schedules so that he may witness, if desired.
- C. Correct and retest work found defective when tested.
- D. System Balance and Testing: Prepare to assist test and balance firm by assuring systems are complete and operational.
- E. Records of Testing: Maintain records of system testing and results thereof. Deliver results as part of project closing file and on an intermediate basis as requested by Architect.

END OF SECTION

SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 260583 - Wiring Connections
- B. Section 262913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. Each motor, controller and all components shall be designed, manufactured, and tested in accordance with the following applicable standards:
 - 1. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).
 - 2. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators 2017.
 - 3. IEEE Standard 112, Test Method "B"; 1996.
 - 4. IEEE Standard 444 (ANSI C34.3); 1992.
 - 5. IEEE Standard 519; 1992.
 - 6. NEMA MG 1 - Motors and Generators 2021.
 - 7. NEMA MG1, Part 31 - Definite Purpose, Inverter Fed Motors; 2012.
 - 8. NEMA - ICS-3-303
 - 9. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - 10. Energy Policy Act of 1992
- B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Submit motor information with submittals and shop drawings for Division 23 equipment.
- C. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- D. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- E. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- F. Operation Data: Include instructions for safe operating procedures.
- G. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment

and store separately.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Windings and Insulation:
 - 1. All motors shall have copper windings.
 - 2. Motors shall be equipped with Class B, 80 deg. C rise or Class F, 105 deg. C rise insulation suitable for use in a 40 deg. C ambient temperature.
 - 3. Motors used for cooling tower applications shall be equipped with Class F, 105 deg. C insulation suitable for use in a 40 deg. C ambient temperature. Windings shall be treated with an epoxy varnish to inhibit the moisture absorption.
- B. Bearings:
 - 1. Single phase, fractional horsepower motors shall be equipped with quiet operating, all angle babbitt lined sleeve bearings.
 - 2. Polyphase motors shall be equipped with deep groove type ball bearings, generously sized for the loads to which applied and for severe duty application. Provide the necessary seals on the shaft to keep the bearing system free of contamination and moisture. Lubricant shall be high temperature, non-bleeding grease.
 - a. Provide inlet and outlet plugs on poly phase motors so that grease fittings can be easily inserted for bearing lubrication except as otherwise specified. The end shields shall be carefully machined to add extra grease capacity. Lower outlet plugs shall be equipped with combination breather/drains on TEFC and TEAO motors.
- C. Motors on belt driven equipment shall have slide rails with adjusting screws for belt tension adjustment.
- D. Sound power levels shall not be greater than recommended in NEMA M61-12.49. Inverter duty rated motors shall not increase by more than 3 dB when operating on a variable frequency motor controller.
- E. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.
- F. Motors exposed to the weather shall be weather protected.
- G. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F (40 degrees C) environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- H. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- I. Motors shall be specifically designed for quiet operation and for severe duty. Standard open drip proof motors shall be equipped with aluminum or stainless steel stamped nameplates. Totally enclosed fan cooled and air over motors shall be equipped with stainless steel stamped nameplates with either zinc or cadmium plated hardware. Motor nameplates shall clearly indicate frame size, horsepower, frequency, voltage, speed, starting torque class, insulation class, service factor and winding material.
- J. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Single phase motors for fans and blowers: Capacitor start type.
- D. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.
- E. Motors located in exterior locations: Totally enclosed type.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, pre-lubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Align motors on direct drive equipment using dial type gauges.
- C. Check line voltage and phase and ensure agreement with nameplate. Test motor for proper rotation under Division 26.

3.02 ADJUSTMENTS

- A. Motors, together with driven equipment, shall be dynamically and statically balanced. Imbalance shall be reduced to minimum specified by equipment manufacturers.

END OF SECTION

**SECTION 23 05 48
VIBRATION ISOLATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolation for all Division 22 and 23 systems as noted below. Provide all miscellaneous items (angle iron, bolts, rods, etc.) required for a complete system. Contractor and vendors shall thoroughly coordinate all vibration isolation systems.
- B. Coordination of installation with other trades (placement of anchor bolts in concrete slabs, etc.)

1.02 RELATED REQUIREMENTS

- A. Section 01 45 33

1.03 MANUFACTURER RESPONSIBILITIES

- A. Manufacturer of vibration isolation and seismic control products shall have the following responsibilities:
 - 1. Manufacturer of vibration isolation shall have the following responsibilities:
 - a. Determine vibration isolation and restraint sizes and locations for mechanical and plumbing equipment.
 - b. Determine vibration isolation sizes and locations for mechanical and plumbing equipment.
 - c. Provide isolation systems for all plumbing and mechanical of equipment (vibration isolated and non-isolated) and systems (piping).
 - d. Provide installation instructions and drawings.
- B. Vibration isolation specialist shall coordinate his work with that of other trades to verify that equipment speeds, in revolution per minute (rpm), are based upon actual equipment installed at the project site.
- C. Verify that equipment rpm and spring deflection selected are arranged so that resonance is avoided.
- D. Exact mounting sizes, dimensions and quantity of isolators and static deflection required shall be determined by the isolator manufacturer based upon equipment that will be furnished and installed by the contractor under this Contract.

1.04 SUBMITTALS

- A. Submit product data and related information noted below in accordance with the provisions of Division 01.
- B. Contractor's Certification: Vibration isolator submittals shall include a certification, signed by an officer representing the Contractor and stipulating that the submittal prepared by the manufacturer has been reviewed, and checked on an item by item basis against each piece of mechanical equipment, piping, ductwork, and panel shown or specified in the Contract Documents, which requires vibration isolation and/or support.
- C. Manufacturer's Certification: The manufacturer or manufacturers (if there are more than one) shall each certify that the selections of vibration isolation equipment are based upon the drawings and specifications, and that each piece of mechanical equipment has been examined for rotational speed, equipment type, mounting location, and supporting span between column centers, and that an appropriate isolator has been selected.
- D. Product Data: Furnish manufacturer's product data covering each isolator type for style, characteristic, and finish. Isolator quantities, dimensions, deflections, capacities, and types shall remain the responsibility of the manufacturer and the contractor.

1.05 QUALITY ASSURANCE

- A. Responsibility for Products: Select deflection for spring isolators in accordance with recommendations in the current issue of ASHRAE Handbook of Fundamentals, unless noted otherwise on drawings.

- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than 10 years of documented experience.
 - 1. Member of Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

1.06 STORAGE AND PROTECTION

- A. Storage: Store vibration isolation equipment indoors in the manufacturer's original shipping containers. Preclude the entrance of construction dirt and debris. Vibration isolation equipment and bases, which show signs of rust, cement or concrete fouling, dirt and construction debris shall be disassembled and cleaned, approved, or removed from the project site and replaced with new.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Amber Booth, Kinetics Noise Control, Korfund Company, Mason Industries, Vibration Eliminator Co., or Vibration Mountings & Controls.
- B. Furnish vibration isolators by single manufacturer.
- C. Substitutions: Not permitted.

2.02 PRODUCTS

- A. Type 3: Mason SLF, free standing spring isolator, 1/4" neoprene non-skid pad, leveling bolt, spring diameter no less than 0.8 of compressed height at rated load, minimal additional travel to solid equal to 50% or rated deflection.
- B. Type 4: Mason SLR, restrained spring isolator with combination leveling bolt and equipment fastening bolt, vertical limit stops with internal neoprene pad, 1/4" external neoprene isolation pad under base plate. Springs shall be rigidly attached to the mounting base plate and spring compression plate.
- C. Type 6: Mason 30N, spring and double neoprene hanger, 1-1/4" neoprene element at top of housing, spring seated in neoprene cup at bottom of housing, designed to allow 30 degrees arc from side to side of hanger rod.
- D. Type 13: Mason HS spring hanger, spring seated in neoprene cup.

2.03 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall conform to the respective specifications and other requirements specified below:
 - 1. Square head bolts and heavy hexagon nuts, ANSI B18.2.1 and ANSI B18.2.2, and ASTM A 307 or ASTM A 576.
 - 2. Sway Brace Material used for members shown on mechanical drawings, except for pipes, shall be structural steel conforming with ASTM A 36. Steel pipes shall conform to ASTM A 501.

PART 3 - EXECUTION

3.01 VIBRATION CONTROL

- A. Size vibration control equipment in accordance with weight distribution, pull or the imposed torque as shown on equipment shop drawings. Minimum static deflections may be revised subject to prior approval.
- B. Provide revised vibration control equipment to match revised or substituted equipment.
- C. Install vibration control equipment in accordance with the manufacturer's installation instructions and as specified.
- D. Install equipment on vibration isolation curbs to provide watertight seal.

3.02 APPLICATIONS

- A. Equipment: Use the vibration and restraint types listed above on the following applications:
 - 1. Fans, suspended
 - a. Type 6

3.03 ANCHORING

- A. Installation: Installation shall comply with manufacturer's published recommendations and shall be installed so that isolators are plumb and are operating at a manner for which they were designed.

3.04 ANCHOR BOLTS

- A. If the size and number of the anchor bolts are not shown on the drawings then anchor bolts shall conform to the schedule for the various equipment weights or the manufacturer's installation recommendations, whichever is the most stringent.

3.05 INSTALLATION

- A. Set anchor bolts when concrete is placed.
- B. Install isolators in accordance with recommendations of isolator manufacturer and equipment manufacturer.
- C. Isolate mechanical equipment as indicated.
- D. Remove all debris from under equipment, and thoroughly clean steel bases, inertia bases and check for free movement.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. HVAC systems testing and balancing requirements.

1.02 REFERENCE STANDARDS

- A. AABC - Associated Air Balance and Control
- B. NEBB - National Environmental Balancing Bureau

1.03 SCOPE OF WORK

- A. Perform test and balance in accordance with AABC or NEBB Standards.
- B. Air balance shall be performed by qualified personnel experienced in this field.
- C. The air balance procedure followed and forms used shall agree with AABC or NEBB Standards.
- D. Make changes to pulleys, belts, dampers, impellers, and similar equipment to obtain design conditions as required by TAB procedures.

PART 2 - PRODUCTS

2.01 NOT APPLICABLE

PART 3 - EXECUTION

3.01 PROCEDURES

- A. On completion of work, submit three copies of the complete report to include the following:
 - 1. Current certification documentation of all TAB equipment used.
 - 2. Current certification of TAB personnel responsible for the work.
 - 3. Dates, time, all personnel, and operating status of cooling and heating systems.
 - 4. A description of the procedure used for air and water balance.

3.02 AIR SYSTEMS

- A. Balance supply, return, and exhaust air outlets within 10% of design while still maintaining required pressure relationships.
- B. On each fan system, measure and report:
 - 1. Design and actual fan RPM. Fan suction and discharge pressure. Fan total static pressure, and pressure drop across components. Design and actual supply, return, exhaust, and outside air CFM.
 - 2. Actual and motor nameplate voltage and amperage on fans.
 - 3. Design and actual entering and leaving air temperatures, heating and cooling (dry bulb and wet bulb) of the supply, return, exhaust, and outside air.

END OF SECTION

SECTION 23 31 13
SHEETMETAL DUCTWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Rectangular Metal Ducts
- B. Round Ducts
- C. Duct Sealant Material

1.02 RELATED REQUIREMENTS

- A. Division 07 - Firestopping
- B. Division 09 - Painting and Coating
- C. Section 23 01 30.51 - HVAC Air Duct Cleaning
- D. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC

1.03 REFERENCE STANDARDS

- A. ASHRAE Handbook - Fundamentals; 2013.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2012.
- F. SMACNA 1972 - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- G. SMACNA 1966 - HVAC Duct Construction Standards; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

1.04 SUBMITTALS

- A. Submit material/product data in accordance with the provisions of Division 01.
- B. Duct dimensions shown on drawings indicate inside clear dimensions. Make calculation allowances for duct requiring internal sound lining, or insulation to provide "inside clear" (IC) dimensions.
- C. Coordinated Shop Drawings: Provide coordinated shop drawings for sheet metal work in mechanical equipment rooms, and other congested areas listed.
 - 1. Draw to a scale of 1/2 inch to 1 foot.
 - 2. Provide sheet sizes to match Contract Drawings.
 - 3. Show duct sizes.
 - 4. Show bottom duct elevations from finished floor.
 - 5. Show lighting, equipment, maintenance and operating clearances, HVAC piping, plumbing piping, medical gas piping, pneumatic tube system, conduit 3" and larger, and columns and beams with mounting heights.
 - 6. Show construction details of all fittings and connections to equipment.
 - 7. Show construction details of plenums and casing.
- D. Field Conditions
 - 1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturer.
 - 2. Maintain temperature within acceptable range during and after installation of duct sealants.

1.05 QUALITY ASSURANCE

- A. Provide an installed duct system which will supply the air quantities indicated by the drawings and have the lowest possible friction loss with the least possible leakage loss. System static pressure loss for each system shall not exceed that which is indicated in the equipment schedule as external static pressure or in the fan schedule as static pressure and shall include the losses of all accessories. Friction losses shall be minimized by reduction in the number of offsets and elbows by pre-planning the duct system installation and coordination with other trades to prevent interferences. Maintain access to accessories requiring maintenance, service, and inspection. Radius elbows are preferred for turns to minimize friction, noise, and vibrations.
- B. Provide and/or construct materials, ductwork, joints, transformations, splitters, dampers, and access doors as specified herein for the sheet metal ductwork as shown on drawings.
- C. SMACNA Manual: Sheet Metal Tradesman shall have access on the construction site to "HVAC Duct Construction Standards". Comply with applicable provisions of the SMACNA Manual and more stringent requirements of this specification.
- D. Quality control involves not only the general performance requirements for air ducts, but also quality workmanship which includes layout pre-planning so that offsets, rises, falls, elbows, fittings, etc., are minimized or eliminated. General performance requirements for ducts include:
 - 1. Dimensional stability (shape deformation and strength)
 - 2. Containment of the air being conveyed (leakage control). See Part 3 of this specification for leakage testing.
 - 3. Vibration (fatigue and appearance)
 - 4. Noise (generation, transmission, or attenuation)
 - 5. Exposure (to damage, weather, temperature extremes, flexure cycles, wind, corrosive atmospheres, biological contamination, flow interruption or reversal, underground or other encasement conditions, combustion, or other in-service conditions)
 - 6. Support (alignment and position retention)
 - 7. Seismic restraint
 - 8. Thermal conductivity (heat gain or loss and condensation control)
- E. Provide galvanized duct materials which meet applicable requirements of local and state codes, whichever is the most stringent.
- F. Support ductwork in accordance with applicable requirements of local and state codes and details on drawings.
- G. Emboss fittings with material gauge, manufacturer, and type material.
- H. Sealers, liners, pre-insulated jackets, and flexible ducts shall comply with a flame spread rating of 25 or less and a smoke developed rating of not over 50.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Sheet metal ductwork, angles, bar slips, hangers, and straps: Galvanized, prime quality steel sheets.
- B. Screws: Cadmium plated.
- C. Joint and Seam Sealers:
 - 1. Acceptable Manufacturers: Carlisle Hard Cast Duct Sealants; Design Polymeric; Ductmate Industries; Childers (HB Fuller Construction Products).
 - 2. Meets Seal Class A.
 - 3. Water resistant, mold and mildew resistant
 - 4. Suitable for indoor use and outdoor use with UV inhibitors.
 - 5. Surface burning characteristics: Flame spread of zero and smoke developed of zero when tested in accordance with ASTM E84.
 - 6. UL Listed and Labeled to UL181.
 - 7. Suitable for metal duct, duct fabric and flex duct.

8. For Pressure Classifications 2" and less, indoors, use Carlisle Flex-Grip 550 for joints and seams.
 9. For bolted duct joints and connections (Nexus, Ductmate, Elgen, TDC, TDF), use Ductmate DM440 Butyl Gasket Sealing Tape with Iron Grip 601 sealant at corner joints.
 10. For all outdoor duct joints and seams, use Carlisle Versa-Grip 181, fiber reinforced with UV inhibitors, for all pressure classifications on all joints and seams.
 11. For active live air flow systems, use Carlisle Aluma-Grip AFT-701, heavy-duty rolled mastic sealant on joints and seams.
 12. Pressure sensitive foil tape is not acceptable and shall not be used as a duct joint sealer.
- D. Duct Sealing:
1. All longitudinal and transverse joints, seams, taps, spin-ins, branch connections, access doors, access panels, duct connections to equipment and duct sidewall penetrations, regardless of pressure classification, shall be sealed with duct sealer. Follow SMANCA Table 1-2, Seal Class A for all supply, return, exhaust, relief, and make-up air ductwork.
 2. See Leakage Testing of Installed Systems requirements in Part 3.
- E. Sheetmetal and air duct accessories: As specified in Section 23 33 00.

2.02 PRESSURE CLASSIFICATION

- A. Ductwork where maximum dimension is less than 97" shall be constructed based on applicable pressure classification in accordance with SMACNA Manual including sheetmetal gauge, reinforcement gauge and spacing.
- B. Construct the following for 1" pressure classification, Table 1- 4:
1. Supply ductwork downstream of air terminal units
 2. Low pressure supply ductwork to reheat coils
 3. Low pressure supply, return, and outside air ductwork at fan coil units
- C. Construct the following for 2" pressure classification, Table 1- 5:
1. Return ductwork
 2. Exhaust ductwork
 3. Make-up air ductwork

2.03 RECTANGULAR DUCTWORK

- A. Transverse Joints:
1. "S" and drive construction for 1" and 2" w.g. pressure classification.
 - a. Provide duct gauge and reinforcing angles in accordance with Table 1-11
 2. Duct Connection System: Connection system as manufactured by Ductmate or Nexus shall incorporate gasketed joints, metal cleats and bolted corners. Minimum metal gauge shall be 24 gauge. Connection systems may be used for all pressure classifications.
 3. For pressure classifications above 2", use double "S" joint up to 30" and companion angle or manufacturer's connection system above 30".
- B. Longitudinal Seams: Pittsburgh Lock
- C. Transitions:
1. Do not exceed 1" in 7" of slope for increase-in-area transitions.
 2. Do not exceed 1" in 4" of slope for decrease-in-area transitions, 1" in 7" is preferable.
 3. Do not exceed 45 degrees on the entering or leaving side for angle of transitions at connections to equipment without the use of approved turning vanes.
- D. Elbows:
1. Fabricate ells using one of the following specifications: The fabrication methods are listed in order of preference. Use radius elbows where ever possible. Use square elbows only when available space prevents the use of radius elbows.
 - a. Unvaned, long radius elbow with the throat radius equal to 3/4 of the width of the duct and with a full heel radius.
 - b. Six inch throat radius with full radius, single thickness vanes and full heel radius. Maximum unsupported length of vanes shall be 36". Securely fasten vanes to runners. Secure vanes in stable position. Construct vane edges to project tangents

- parallel to duct sides.
- c. Square elbows with airfoil, double thickness turning vanes.
- 2. Turning vanes:
 - a. Acceptable manufacturers: Aero Dyne
 - b. Substitutions: Not permitted.
 - c. True airfoil design; smoothly-rounded entry nose with extended trailing edge. Generated sound power level shall not exceed 54 decibels in band 4 at 2000 FPM in a 24"x24" duct.
 - d. Fabricate assemblies with Aero Dyne Co. side rails; install vanes on design centers of 2.4 inches across the full diagonal dimension of the elbow.
 - e. Submit Aero Dyne product and performance data for review.
- E. Branch Connections:
 - 1. Pressure classification 2" and less:
 - a. Rectangular branch from rectangular main: 45 degree entry with all corners closed as shown in Figure 2-8
 - b. Round branches: Spin-in fitting without scoop.
 - c. Parallel flow branches: See Figure 2-7.
 - d. Space duct joints to avoid cutting them for branch take offs and outlet collars.
 - 2. Pressure classification above 2":
 - a. Round branches: Conical round fittings only.
 - b. Rectangular branch from rectangular main: 45 degree entry with all corners closed as shown in Figure 2-8
 - c. Parallel flow branches: See Figure 2-7.
 - d. Space duct joints to avoid cutting them for branch take offs and outlet collars.

2.04 ROUND DUCTWORK

- A. Applicable for pressure classification above 2".
- B. Round Duct Snap-Lock Pipe and Fittings:
 - 1. Manufactured from galvanized steel meeting ASTM A653. Construction shall be in accordance with SMACNA HVAC Duct Construction Standards.
 - 2. Use appropriate seams made to eliminate leakage based on pressures for which system has been designed.
 - 3. Fittings and couplings shall have minimum gauges specified by SMACNA Manual.

PART 3 - EXECUTION

3.01 INSTALLATION, APPLICATION, ERECTION

- A. Seal all transverse and longitudinal joints and seams and duct wall penetrations with approved sealer in accordance with manufacturer's directions regardless of pressure class.
- B. Support round ducts from building structure with galvanized steel hangers in accordance with SMACNA. Secure hangers to masonry portion of building by means of inserts or other acceptable anchors.
- C. Secure hangers to steel structure members by means of C-clamps. Vertical risers, and other duct runs where methods of support specified above are not applicable, shall be supported by angle brackets as shown in SMACNA manual.
- D. Where appropriate based on duct weight, support rectangular ducts by minimum, 1" x 18 gauge, galvanized band iron or minimum 3/8" galvanized rod hangers attached to reinforcing angles and spaced same as reinforcing angles. Design hangers, reinforcing angles and other components to support weight of duct and insulation. Secure hangers to concrete beam or slab by adequately sized inserts, anchor shield and bolt, toggle bolt, or expansion bolt.
- E. Attach hangers to ductwork using sheet metal screws.
- F. Space hangers approximately 8' along the duct for ducts under 60". For ducts over 60" and larger and heavier sections, such as welded duct and sound absorbers, space hangers at approximately 4' intervals.

- G. Hangers and bracing used with ductwork shall be galvanized.
- H. Provide smooth insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. Provide metal collar equivalent in depth to insulation thickness. Access door locks and damper handles shall be free from mastic or sealant.
- I. In addition to the requirements above, add supplemental bracing as necessary to prevent sagging and drumming, and/or vibration.

3.02 CLEANING

- A. Clean mechanical system thoroughly to assure all foreign matter and dirt is removed.

3.03 AIR TEST AND BALANCE

- A. Prepare the system for tests as specified in Section 23 05 93 and correct deficiencies found by the Test and Balance firm.
- B. Duct dimensions shown on drawings indicate inside clear dimensions. Make calculation allowances for duct requiring internal sound lining, or insulation to provide "inside clear" (IC) dimensions.

END OF SECTION

**SECTION 23 33 00
AIR DUCT ACCESSORIES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Flexible duct connections.
- C. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 233113 - Sheetmetal Ductwork.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- B. SMACNA 1966 - HVAC Duct Construction Standards; 2005.
- C. UL 181 - Factory-Made Air Ducts and Air Connectors; 2013.
- D. AMCA 511 - Certified Ratings Program-Product Rating Manual for Air Control Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Provide product data and information in accordance with the provisions of Division 01.
- B. Product Data: Submit manufacturer's product data for review. Include electrical characteristics and connection requirements where applicable.
- C. Project Record Drawings: Record actual locations of volume dampers, rated dampers, access doors, and test holes.

PART 2 - PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

- A. Acceptable manufacturers: Louvers & Dampers, Nailor Industries, Ruskin Company, or Pootorf or LLoyd .
 - 1. Substitutions: Refer to Division 01.
- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch (150 mm) width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; counter-balance adjustment device to permit setting for varying differential static pressure.
- C. Damper and blade material shall be of the same material as the duct in which it is installed.

2.02 FLEXIBLE DUCT

- A. Acceptable manufacturers: Thermaflex M-KE
 - 1. Substitutions: Refer to Division 01.
- B. Characteristics of flexible duct to air terminals:
 - 1. Approved as UL 181 Class 1 air duct with a minimum rated air velocity of 4,000 feet per minute and pressure rated for a minimum of 4-inches water gauge positive pressure and 1-inch water gauge negative pressure.
 - 2. Composed of a Chlorinated Polyethylene (CPE) liner duct permanently bonded to a coated spring steel wire helix.
 - 3. Fire-retardant, low permeability outer vapor barrier of fiberglass reinforced film laminate with a permanence of not greater than 0.05 perms when tested in accordance with ASTM E 96 Procedure A.
 - 4. Flame spread less than 25, smoke developed rating less than 50.
 - 5. Insulated with 1/2" thick fiberglass insulation.

6. Provide a minimum of three feet of flexible duct upstream of diffusers. Do not exceed six feet of length.
 7. Flexible duct shall meet standards of local building code.
 8. The duct shall have passed an impact test equal to the UL 181 standard, conducted by a nationally recognized testing laboratory except it shall use a 25-pound weight dropped from a height of 10 feet. The inner and outer surfaces shall not have ruptured, broken, torn, ripped, collapsed, or separated. The helix shall rebound to a cross-sectional elliptical area not less than 80 percent of the original test sample diameter.
- C. The use of flex duct shall be limited to flexible air connector applications.
 - D. Seal off the insulation jacket at its ends and at joints with mastic, hard cast, or similar material. Replace flex if jacket is punctured.
 - E. Complete insulation coverage up to the diffuser neck connection.
 - F. Do not route flexible duct through corridor walls or fire or smoke rated partitions, barriers, or walls.
 - G. No bends shall be made in flexible duct with the center line radius less than one and one-half duct diameter and only one bend may occur per four foot length of duct material.

2.03 FLEXIBLE DUCT CONNECTIONS

- A. Acceptable manufacturers: Carlisle, Durodyne, Elgen, or DuctMate.
 1. Substitutions: Refer to Division 01.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards and as indicated.
- C. Flexible Duct Connections: Fabric crimped into metal edging strip with 10" w.g. positive and negative pressure rating.
 1. Fabric: NFPA 90A compliant, UL listed fire-retardant neoprene coated woven glass fiber fabric, minimum 28 oz. density.
 - a. Net Fabric Width: Approximately 3 inches (75 mm) wide.
 2. Metal: 3 inches (75 mm) wide, 24 gauge, 0.0239 inch (0.61 mm) thick galvanized steel. Provide aluminum or stainless steel metal as required to match ductwork material.

2.04 VOLUME CONTROL DAMPERS

- A. Acceptable manufacturers: Louvers & Dampers, Greenheck, McGill Airflow, Ruskin, or SEMCO.
 1. Substitutions: Refer to Division 01.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards and as indicated.
- C. Damper and blade material shall be of the same material as the duct in which it is installed.
- D. Where manual or motorized volume dampers and control dampers are installed in outside air ducts in coastal climates subject to salt air, provide dampers of aluminum construction with appropriate supports and handles.
- E. Splitter Dampers:
 1. Material: Same gauge and material as duct to 24 inches (600 mm) size in either direction, and two gauges heavier for sizes over 24 inches (600 mm).
 2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 3. Operator: Minimum 1/4 inch (6 mm) diameter rod in self-aligning, universal joint action, flanged bushing with set screw .
- F. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).
 1. Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).
 2. Blade: 22 gauge, minimum.
 3. Frame: 18 gauge, minimum.
- G. Multi-Blade Damper: Fabricate of opposed blade pattern with 3V or airflow shaped blades and maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

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1. Blade: 18 gauge, 0.0478 inch (1.21 mm), minimum.
- H. End Bearings: Except in round ducts 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
- I. Quadrants:
 1. Provide locking, indicating quadrant regulators on multi-blade dampers.
 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

2.05 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction equal to Carlisle Dynair Duct Protection Film. Use to cover all open ends of stored or hung ductwork during construction.
 1. Thickness: 2 mils (0.6 mm).
 2. High tack water based adhesive.
 3. UV stable light blue color.
 4. Elongation before break: 325 percent, minimum.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories in locations specified and as shown on drawings in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards. Refer to Section 233113 for duct construction and pressure class.
- B. At fans and motorized equipment associated with ducts, provide flexible duct connections between equipment discharge and adjoining ductwork or plenum.
- C. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- D. Provide all screws, bolts, nuts, inserts, and material required for attaching sheetmetal to duct, walls, floors, and ceilings.

3.02 TESTING

- A. Check work for satisfactory installation and performance.
- B. Insure that adequate access does in fact exist for rated dampers, that damper blade movement is not restricted, and that damper operator motors are not hindered in operation by proximity to walls or other objects.
- C. Check duct connections at access doors for air leakage or condensation. Correct deficiencies found.

END OF SECTION

SECTION 23 82 39
TERMINAL HEATING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cabinet Unit Heaters

1.02 RELATED REQUIREMENTS

- A. Division 26: Electrical

1.03 SUBMITTALS

- A. Submit product data for review in accordance with the requirements of Division 01. Provide equipment performance data indicating compliance with and meeting the capacities scheduled on the drawings.
- B. Submit schedules of equipment and enclosures typically indicating the length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of scheduled heat required to actual heat output provided.
- C. Indicate mechanical and electrical service locations and requirements.

1.04 QUALITY ASSURANCE

- A. Provide U.L. listing and labels on all units.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of 5 years documented experience.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. As noted for each product type below.

2.02 UNIT HEATERS

- A. Acceptable Manufacturers: Airtherm, American Air, Dunham Bush, Modine, Reznor, Sterling, or Trane.
- B. Cabinet Unit Heaters: Size, type and capacity as indicated on drawings.
 - 1. Vertical cabinet, vertical recessed, horizontal cabinet, or horizontal recessed models as indicated on drawings.
 - 2. Unit includes chassis, coil, fan, motor, high density fiberglass insulation, and stamped lattice outlet and discharge grilles.
 - 3. Chassis: Minimum 18 gauge galvanized steel wrap around structural steel frame with all edges flanged.
 - 4. Cabinet finish:
 - a. All parts cleaned, bonderized, phosphatized, and flow coated with baked-on primer
 - b. Final finish: Baked on powder coat finish. Color to be approved by Architect.
 - 5. Coil:
 - a. 5/8" O.D. seamless copper tubes mechanically bonded to configured aluminum fins with continuous fin collars and sleeved coil end supports
 - b. Maximum working pressure 300 psig, factory burst test 450 psig (air), and leak test 125 psig
 - 6. Motors:
 - a. Brushless electronically commutated motor (ECM) of sizes indicated on drawing
 - b. Thermal overload protection
 - 7. Centrifugal forward curved fan with galvanized steel double width wheels
 - 8. Filters - 1" MERV 8 woven glass filters
 - 9. Units wired in accordance with NEC and U.L. listed
 - 10. Wall mounted thermostat/fan controller by unit manufacturer.

2.03 HYDRONIC RADIANT CEILING PANELS

- A. Acceptable Manufacturers:
 - 1. Sterling
 - 2. Airtex
 - 3. Marley Engineered Products
 - 4. Zehnder Rittling
- B. Modular 2' x 2' or 2' x 4' panels made for lay-in installation to transfer heat between copper tubes and panel face.
 - 1. Water tubes: 1/2" minimum ID copper tubing, serpentine, 5 or 6 pass with water connections on same end only for solder or compression fittings. Provide factory installed supply and return bends.
 - 2. Heat sink construction: Mechanically fasten extruded aluminum and copper pipe to heat sink. Provide non-hardening heat transfer paste between tubing, heat sink and panel.
 - 3. Panel face construction shall be minimum 18 gage aluminum with silk screened finish or as directed by Architect to match lay-in tile. Maintain optimal radiative properties, durability and cleanability.
 - 4. Insulation: 1" thick 3/4 lb/cu ft. foil backed fiberglass laid over the back of the panel after installation and testing.
 - 5. Provide 18" long braided stainless steel hoses with isolation ball valves at connection points.
- C. Linear panels:
 - 1. Extruded aluminum, 18" wide of various lengths as shown on plans.
 - 2. Piping: 5/8" OD tubing, 4 tube min/panel. Mechanically fastened with heat transfer paste through tube saddle to panel.
 - 3. Finish: Castellated and painted with electrostatic acrylic powder paint.
 - 4. Insulation: 1" thick, 3/4 lb/cu. ft. foil backed fiberglass laid over back of panel after installation and testing.
 - 5. Panel shall be complete with factory installed supply and return bends.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions in locations scheduled on drawings.
- B. Coordinate electrical connections and maintain accessibility.
- C. Protect unit and provide finished units with protective covers during the balance of construction.

3.02 START-UP, TEST, DEMONSTRATION

- A. Start-up and test equipment for proper operation.
- B. Operate and test all safety devices and controls.
- C. Demonstrate operation of equipment to maintenance personnel.
- D. Remove and replace malfunctioning units and retest.

3.03 CLEANING

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

END OF SECTION

**SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Basic materials and methods, along with Division 01, General Requirements, that are applicable to Division 26 sections.
- B. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 specification Sections apply to all Division 26 sections.

1.02 RELATED REQUIREMENTS

- A. Perform Work specified in Division 26 in accordance with reference standards listed below of the latest applicable edition adopted by the authority having jurisdiction. Where these Specifications are more stringent, they shall take precedence. In case of conflict, obtain a decision from the Architect.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design.
- B. ICC (IBC) - International Building Code.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities.
- D. NFPA 70 - National Electrical Code.
- E. NFPA 101 - Life Safety Code.
- F. NFPA 5000 - Building Construction and Safety Code.
- G. NFPA 101A: Guide on Alternative Approaches to Life Safety
- H. NFPA 101B: Code for Means of Egress for Buildings and Structures
- I. U.L. Fire Resistance Index.
- J. UL White Book: General information for electrical construction, hazardous location, and electrical heating and air conditioning equipment
- K. BOCA: Building Officials Code Association
- L. City of Dyersburg Electrical Code
- M. State of Tennessee Electrical Code
- N. All applicable Occupational Safety and Health Administration (OSHA) Publications, Rules and Regulations.

1.04 RELATED WORK SPECIFIED UNDER OTHER DIVISIONS

- A. Foundations and pads required for equipment furnished under this Division
- B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting
- C. Flashing of conduits into roofing and outside walls
- D. Plumbing equipment
- E. Cutting and patching for electrical Work, except for errors and omissions under this Division.

1.05 RELATED WORK - OWNER FURNISHED EQUIPMENT AND SYSTEMS

- A. Security System Equipment

1.06 SUBMITTALS

- A. Comply with provisions of Division 01.
- B. Submit product data, equipment details, capacities, and shop drawings as specified in sections of this Division.

- C. Organize submittal material to comply with the following submittal and deviation schedules for ready recognition and uniformity. Required items re listed separately for clarity, but for each specification section , a single, comprehensive package shall be submitted for review. Individual submittals for each line item will not be accepted.
1. SD 01 - Data (Calculations and support criteria)
 2. SD 02 - Manufacturer's Catalog Data
 3. SD 03 - Manufacturer's UL or ETL listing and or rating
 4. SD 04 - Drawings (Layout and Assembly Information)
 5. SD 05 - Design Data
 6. SD 06 - Instructions (Manufacturer's and Engineer of Record)
 7. SD 07 - Schedules (Testing and Demonstration)
 8. SD 08 - Statements (Installer's and Testing Personnel and Procedures)
 9. SD 09 - Reports (Routine Testing and Inspections)
 10. SD 10 - Test Reports (NEMA, ANSI, ASTM required)
- D. Submit dimensioned equipment room layouts.
1. Show location of all electrical equipment in rooms including but not limited to:
 - a. Electrical rooms and closets
 - b. Mechanical Rooms

1.07 QUALITY ASSURANCE

- A. Comply with applicable local, state, and federal codes.
- B. Warrant electrical Work against faulty material or Workmanship in accordance with Division 01. If the Project is occupied or the systems placed in operation in several phases at the request of the Owner, then the warranty of each system or piece of equipment used shall begin on the date each system or piece of equipment was placed in satisfactory operation and accepted as such, in writing, by the Owner. The use of building equipment for temporary service and testing does not constitute the beginning of the warranty.
- C. Equipment and material provided under this Division shall be periodically inspected and serviced by competent mechanics. This function becomes the responsibility of the Owner when the system is accepted by the Owner. The one year material and Workmanship warranty is not intended to supplant normal inspection or service and shall not be construed to mean the Contractor shall provide free service for normal maintenance items such as periodic lubrication and adjustment due to normal use, nor to correct without charge, breakage, maladjustment, and other trouble caused by improper maintenance.
- D. Turn over electrical equipment provided under this Division to the Owner in lubricated condition. Include instructions on further lubrication in the operating manual.
- E. Upon completion of contract and progressively as work proceeds, clean-up and remove dirt, debris and scrap materials. Maintain premises neat and clean. Protect and preserve access to energized equipment at all times. Clean items with factory finishes. Touch-up minor damage to surfaces; refinish entire piece of equipment when sustained major damage. Use only factory supplied paints of matching color and formula. Schedule an off-hour shutdown of all electrical equipment during the 2-week period preceding substantial completion. During this shut down, clean all buses and insulators inside panelboards located inside or adjacent to the project limits.

1.08 OPERATING AND MAINTENANCE MANUALS

- A. Provide manuals in accordance with Division 01.
- B. In addition to required submittals, include copies of all test reports required in Part 3, "Execution" of Section 26 05 00 - Common Work Results For Electrical.
- C. Provide completed warranty certificates for systems and equipment.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as possible, deliver items in manufacturer's original unopened packaging. Where this is not practical, cover items with protective materials to keep them from being damaged. Use care

in loading, transporting, unloading, and storage to keep items from being damaged.

- B. Store items in a clean dry place and protect from damage. Evidence of damage from water or other contaminants will be cause for rejection.

1.10 PRODUCT PROCUREMENT AND SUBSTITUTION

- A. Comply with the provisions of Division 01.

1.11 FEES AND PERMITS

- A. Obtain and pay for all necessary permits and inspection fees required for electrical installation.

1.12 RECORD DRAWINGS

- A. Comply with provisions of Division 01.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Equipment and materials furnished shall be listed by UL or other nationally accredited testing laboratory where available. When listing is not available for a piece of equipment, it shall be submitted in accordance with Drawings and Specifications and shall be approved by the authorities having jurisdiction.
- B. Specifications and Drawings indicate name, type and/or catalog number of materials and equipment to establish standards of quality. Submittals shall be based on the standards specified. The standards should not be construed as limiting competition.
- C. If materials and equipment other than specified herein are intended to be submitted, a letter providing a list of all the suggested alternates by section number, brand and series or model shall be submitted to the Architect for review and approval. Submit in accordance with Division 01 and a minimum of 14 days prior to submission of bids.

2.02 WALL AND CEILING ACCESS PANELS

- A. Style and type as required for material in which installed.
 - 1. Size: 16" X 16" minimum, as indicated, or as required to allow inspection, service and removal of items served
 - 2. 14 gauge minimum sheet metal for doors, 16 gauge frames of cadmium-plated or galvanized construction. Doors shall have expanded plaster rings where located in plaster walls or flanged finish where located in drywall or block construction
 - 3. Panels shall have spring hinges with screwdriver locks in non-public areas. Key lock, keyed alike, for panels in public areas
 - 4. Prime painted or rust inhibitive paint finish
 - 5. UL labeled when in fire-rated construction, 1 1/2 hour rating
 - 6. Provide in walls, floors, and ceilings to permit access to all equipment and junction boxes.
 - 7. Furnish and locate access panels under this Division. Coordinate with trades who are responsible for building system in which panels are to be installed.
 - 8. Acceptable manufactures: Milcor, Nystrom, Karp, J.L. Industries, or Williams Brothers. Use panels equal to Milcor Style M for masonry and drywall construction; equal to Milcor Style K for plastered masonry walls and ceilings. Stainless steel panels shall be used in ceramic tile or glazed structural tile

PART 3 - EXECUTION

3.01 COORDINATION

- A. Install equipment in accordance with manufacturer's recommendations. Where conflicts occur between Contract Documents and these recommendations, request a ruling before proceeding with such Work.
- B. Visit site and observe conditions under which work must be performed. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work required by these documents.
- C. Examine Specifications and Drawings to be familiar with items which require electrical connections and coordination. Electrical Drawings are diagrammatic and shall not be scaled for

exact sizes.

3.02 TEMPORARY LIGHTS AND POWER

- A. Comply with provisions of Division 01.
- B. Provide a temporary electrical lighting and power distribution system of adequate size to properly serve the following requirements, including adequate feeder sizes to prevent excessive voltage drop. Temporary Work shall be installed in a neat and safe manner in accordance with the National Electrical Code, Article 305, NFPA 241, and as required by OSHA or applicable local safety codes.
- C. Provide one pigtail socket with 150 watt lamp, CFL medium base, for every 1,000 square feet of floor area, evenly distributed throughout the building and with minimum of one pigtail socket per room.
- D. Provide suitable guards for temporary lights to prevent accidental contact with lamps.
- E. Provide a minimum of one GFCI-protected duplex power outlet for every 1,500 square feet of floor area, evenly distributed throughout the building. Power outlets shall be GFCI-protected duplex 20 amp, 120 volt.
- F. Provide feeders, disconnects, connections, etc., required for construction equipment, eg: cranes, pumps, etc.
- G. Prior to installation, determine if any lighting or power outlets over the minimum quantity noted above are required and if so, provide them.
- H. Provide service and panelboards required for above lighting and power outlets.
- I. Requirements for payment of utility bills during construction are specified in Division 01.
- J. Provide single phase and three phase service as required by Project.
- K. Remove temporary wiring upon completion of use.

3.03 CUTTING AND PATCHING

- A. Comply with provisions of Division 01
- B. Repair or replace routine damage caused by cutting in performance of Work under this Division.
- C. Correct unnecessary damage caused due to installation of electrical Work, brought about through carelessness or lack of coordination.
- D. Holes cut through walls shall be drilled or cut with tools designed for the purpose.
- E. Repairs shall be performed with materials which match existing materials and be installed in accordance with appropriate sections of these Specifications.
- F. Contractor shall not be permitted to cut or modify any structural members without the written permission of the Architect.

3.04 FOUNDATIONS AND PADS

- A. Provide concrete foundations and pads for equipment per the requirements Division 03. Locate and size foundations, pads, and anchor bolts as required for equipment in this Division.
- B. Provide concrete foundations and pads as required for electrical utility company's equipment such as transformers, CT cabinets, metering cabinets, switches, fused disconnects, and circuit breakers. All work shall be in compliance with the utility company's specifications.

3.05 CONTROL SYSTEMS AND INTERLOCK WIRING

- A. Control systems, components and control and interlock wiring for mechanical equipment will be furnished under Divisions 21, 22 and 23. Control devices including, but not limited to, thermostats, fan speed and level control switches, relays and electro-pneumatic switches shall be furnished under Divisions 22 and 23.

3.06 UTILITY COMPANY COORDINATION

- A. Coordinate with the serving utility company as to all types of work required to be done by the contractor for utility equipment.
- B. Confirm exact location of point of common coupling, duct banks, pads, etc.
- C. Obtain copies of all pertinent utility company specifications relating to duct banks, concrete pads, raceways, and cable that are contractor installed for the utility company use. Maintain copies at project site.
- D. Install all components in compliance with utility company specifications and project specifications.

3.07 TESTING ELECTRICAL SYSTEMS

- A. On completion of work, installation shall be completely operational and entirely free from grounds, short circuits, and open circuits. Perform operational tests as required to demonstrate substantial completion of the Work. Balance circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests. All ampere readings shall be made with a true RMS reading meter.
- B. Perform megger tests of all service entrance circuits, feeder and branch circuits size #4 AWG and larger. Provide a report of all such megger test results.
- C. Furnish the Architect a copy of test reports and required certification including but not limited to the following:
 - 1. Service ground resistance test
 - 2. Panelboard load test - include ampere readings of all panels and major circuit breakers
 - 3. Ground Fault Test
- D. Prior to final observation and acceptance test, install all electrical systems and equipment complete and in satisfactory operating condition.

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Service entrance cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.
- D. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes.
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation.
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
- I. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems.
- J. NFPA 70 - National Electrical Code.
- K. UL 44 - Thermoset-Insulated Wires and Cables.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables.
- M. UL 267 - Outline of Investigation for Wire-Pulling Compounds.
- N. UL 486A-486B - Wire Connectors.
- O. UL 486C - Splicing Wire Connectors.
- P. UL 486D - Sealed Wire Connector Systems.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

- R. UL 854 - Service-Entrance Cables.
- S. UL 2196 - Fire Test for Circuit Integrity of Fire Resistive Power, Instrumentation, Control and Data Cables

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
 - 3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- D. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.
- E. Manufactured Wiring System Shop Drawings: Provide plan views indicating proposed system layout with components identified; indicate branch circuit connections.
- F. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- H. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 - PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Service entrance cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. For overhead service drop, installed in raceway to service head.
 - b. For underground service entrance, installed in raceway.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- H. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- I. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - 2. Control Circuits: 14 AWG.
- J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- K. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 240/120 V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.
 - c. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Acceptable Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Service Wire Co: www.servicewire.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
 - 2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN, except as indicated below.
 - a. Size 4 AWG and Larger: Type THHN/THWN-2.
 - b. Installed Underground: Type XHHW-2.

2.04 SERVICE ENTRANCE CABLE

- A. Acceptable Manufacturers:
 - 1. Copper Service Entrance Cable:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Service Wire Co: www.servicewire.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.
- B. Service Entrance Cable for Above-Ground Use: NFPA 70, Type SE multiple-conductor cable listed and labeled as complying with UL 854, Style R.
- C. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2 and with UL 44 Type RHH/RHW-2.
- D. Conductor Stranding: Stranded.
- E. Insulation Voltage Rating: 600 V.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 7. Conductors for Control Circuits: Use crimped terminals for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

- A. Electrical Tape:
1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 2. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
 3. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
 4. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Suitable for use at installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.
- E. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
1. Products:
 - a. Menzies Metal Products; Electrical Roof Stack and Cap: www.menzies-metal.com/#sle.
 - b. Menzies Metal Products; Electrical Retro Box: www.menzies-metal.com/#sle.

- F. Sealing Systems for conductors in ducts entering/exiting from exterior locations: Sealant system for prevention of moisture, gases and rodents from entering building and/or gear via raceways, designed to be used after cable installation.
 - 1. Must be compatible with wide range of cable jacket materials
 - 2. Designed for used with PVC, GRS, EMT, IMC, fiberglass or PR conduit materials
 - 3. Capable of holding up to 22 feet of water head pressure
 - 4. Products:
 - a. Polywater; FST Foam Duct Sealant kit (2" conduits and larger)
 - b. Polywater; FST Foam Duct Sealant MINI (1.5" conduits and smaller)
 - c. Approved equal

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
 - 8. Provide oversized neutral/grounded conductors where indicated _____.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Exposed Cable Installation (only where specifically permitted):
1. Route cables parallel or perpendicular to building structural members and surfaces.
 2. Protect cables from physical damage.
- F. Direct Burial Cable Installation:
1. Provide trenching and backfilling in accordance with Section 31 23 16.13 - Trenching.
 2. Install cable with minimum cover of 24 inches (610 mm) unless otherwise indicated or required.
 3. Protect cables from damage in accordance with NFPA 70.
 4. Provide underground warning tape in accordance with Section 26 05 53 along entire cable length.
- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- I. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- J. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- M. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.

- b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
- 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
- 3. Wet Locations: Use heat shrink tubing.
- O. Insulate ends of spare conductors using vinyl insulating electrical tape.
- P. Identify conductors and cables in accordance with Section 26 05 53.
- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- R. Install sealant within conduits entering/exiting from exterior or underground to prevent intrusion of moisture, gasses and rodents to building and/or gear.
- S. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for conductors larger than No. 4 AWG. The resistance test for parallel conductors listed as optional is required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.
- D. NFPA 70 - National Electrical Code.
- E. UL 467 - Grounding and Bonding Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Shop Drawings:
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- E. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Ground Ring:
 - a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2 AWG in direct contact with earth, installed at a depth of not less than 30 inches (750 mm).
 - b. Where location is not indicated, locate ground ring conductor at least 24 inches (600 mm) outside building perimeter foundation.
 - 3. Ground Rod Electrode(s):
 - a. Provide single electrode unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 4. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
 - 5. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
 - 6. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- F. Service-Supplied System Grounding:

1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system, sized in accordance with NEC Table 250.66. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed, sized in accordance with NEC Table 250.102 or at 12.5% of the area of the largest ungrounded supply conductor or equivalent area for parallel supply conductors where ungrounded supply conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- G. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Raceways may be used as sole equipment grounding conductor where permitted by NFPA 70. Provide insulated equipment grounding conductor where indicated or required, including but not limited to:
 - a. In each nonmetallic feeder and branch circuit raceway.
 - b. In each flexible conduit.
 - c. In outdoor portions of each metallic feeder and branch circuit raceway utilizing non-threaded fittings (where permitted) supplying rooftop multimotor and combination-load air-conditioning and refrigerating equipment.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for metal building frame.
 8. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

- D. Ground Bars:
 - 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 - 2. Size: As indicated.
 - 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
 - 1. Comply with NEMA GR 1.
 - 2. Material: Copper-bonded (copper-clad) steel.
 - 3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

END OF SECTION

**SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 05 50 00 - Metal Fabrications: Materials and requirements for fabricated metal supports.
- C. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- D. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 25 13 - Low-Voltage Busways: Additional support and attachment requirements for busway.
- G. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- H. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- D. MFMA-4 - Metal Framing Standards Publication.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- F. NFPA 70 - National Electrical Code.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 03 30 00.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

- B. Submit all items in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- D. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- E. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.
- F. Installer's Qualification Statement: Include evidence of compliance with specified requirements.
- G. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- D. Installer Qualifications for Field-Welding: As specified in Section 05 50 00.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - 2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled by Underwriters Laboratories (UL) as suitable for the purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - 7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

- d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.
 - 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, low voltage cable tray systems, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Field-Welding (where approved by Architect): Comply with Section 05 50 00.
- H. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 30 00.
 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Conduit Support and Attachment: Also comply with Section 26 05 33.13.
 - J. Box Support and Attachment: Also comply with Section 26 05 33.16.
 - K. Busway Support and Attachment: Also comply with Section 26 25 13.
 - L. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00.
 - M. Exterior Luminaire Support and Attachment: Also comply with Section 26 56 00.
 - N. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
 - O. Secure fasteners according to manufacturer's recommended torque settings.
 - P. Remove temporary supports.
 - Q. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. PVC-coated galvanized steel rigid metal conduit (RMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Electrical metallic tubing (EMT).
- H. Rigid polyvinyl chloride (PVC) conduit.
- I. Reinforced thermosetting resin conduit (RTRC).
- J. Conduit fittings.
- K. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- G. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC).
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S).
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A).
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT).
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.
- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
- K. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series.
- L. NEMA TC 14.AG - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- M. NEMA TC 14.BG - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- N. NFPA 70 - National Electrical Code.

- O. UL 1 - Flexible Metal Conduit.
- P. UL 6 - Electrical Rigid Metal Conduit-Steel.
- Q. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel.
- R. UL 514B - Conduit, Tubing, and Cable Fittings.
- S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
- T. UL 1242 - Electrical Intermediate Metal Conduit-Steel.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Submit all items in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- D. Shop Drawings:
 - 1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
 - 2. Include proposed locations of roof penetrations and proposed methods for sealing.
- E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
 - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 - 6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
 - 7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- J. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.
- K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- L. Corrosive Locations Above Ground: Use PVC-coated galvanized steel rigid metal conduit, aluminum rigid metal conduit, or reinforced thermosetting resin conduit (RTRC).
- M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
- N. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

2.02 CONDUIT REQUIREMENTS

- A. Electrical Service Conduits: Also comply with Section 26 21 00.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

- C. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 1/2 inch (16 mm) trade size.
 - 4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
 - 5. Underground, Interior: 3/4 inch (21 mm) trade size.
 - 6. Underground, Exterior: 1 inch (27 mm) trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 - 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 - 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use aluminum.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/#sle.

3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).
- D. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).
- E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.07 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:

1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.09 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 2. Nucor Tubular Products: www.nucortubular/#sle.
 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
 5. Sentinel Electrical Products: www.sentinelelectricalproducts.com
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 1. Cantex Inc: www.cantexinc.com/#sle.
 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
 3. JM Eagle: www.jmeagle.com/#sle.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.11 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Manufacturers:
 1. Champion Fiberglass, Inc: www.championfiberglass.com.
 2. FRE Composites: www.frecompositesinc.com
 3. United Fiberglass of America, Inc: www.unitedfiberglass.com
- B. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
- C. Supports: Per manufacturer's recommendations.
- D. Fittings: Same type and manufacturer as conduit to be connected.

2.12 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- C. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).
- E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.
- F. Sealing Systems ducts entering/exiting from exterior locations: Sealant system for prevention of moisture, gases and rodents from entering building and/or gear via raceways, designed to be used after cable installation.
 - 1. Must be compatible with wide range of cable jacket materials
 - 2. Designed for used with PVC, GRS, EMT, IMC, fiberglass or PR conduit materials
 - 3. Capable of holding up to 22 feet of water head pressure
 - 4. Products:
 - a. Polywater; FST Foam Duct Sealant kit (2" conduits and larger)
 - b. Polywater; FST Foam Duct Sealant MINI (1.5" conduits and smaller)
 - c. Approved equal

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.

6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 9. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
 10. Route conduits above water and drain piping where possible.
 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 12. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
 13. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 14. Group parallel conduits in the same area together on a common rack.
- I. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
 9. Use of spring steel conduit clips for support of conduits is not permitted.
 10. Use of wire for support of conduits is not permitted.
 - a. For securing conduits to studs in hollow stud walls.
 - b. For suspending conduits supported by spring steel conduit clips (only where specifically indicated or permitted).
 11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- J. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with

- finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- K. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Provide suitable modular seal where conduits penetrate exterior wall below grade. All bolts, nuts and fasteners shall be steel with 2-part Dichromate corrosion inhibiting coating or Type 316 Stainless steel.
 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 9. Provide metal escutcheon plates for conduit penetrations exposed to public view.
 10. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- L. Underground Installation:
1. Provide trenching and backfilling in accordance with Section 31 23 16.13.
 2. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
 3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.
- M. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Include proposed conduit arrangement with submittals.
 2. Maximum Conduit Size: 1 inch (27 mm) unless otherwise approved.
 3. Minimum Conduit Spacing: _____.
 4. Install conduits within middle one third of slab thickness.
 5. Secure conduits to prevent floating or movement during pouring of concrete.
- N. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 03 30 00 with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.
- O. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
 4. Where conduits are subject to earth movement by settlement or frost.

- P. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
 - 1. Where conduits pass from outdoors into conditioned interior spaces.
 - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
 - 3. Where conduits penetrate coolers or freezers.
- Q. Install sealant within conduits entering/exiting from exterior or underground to prevent intrusion of moisture, gasses and rodents to building and/or gear.
- R. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.
- S. Provide grounding and bonding in accordance with Section 26 05 26.
- T. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Underground boxes/enclosures.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 27 26 - Wiring Devices:
 - 1. Wall plates.
 - 2. Additional requirements for locating boxes for wiring devices.
- H. Section 27 10 00 - Structured Cabling System: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- G. NFPA 70 - National Electrical Code.
- H. SCTE 77 - Specifications for Underground Enclosure Integrity.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.
- K. UL 508A - Industrial Control Panels.
- L. UL 514A - Metallic Outlet Boxes.
- M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working

- clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for junction and pull boxes and cabinets and enclosures.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, and cabinets and enclosures.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
 4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
 5. Use nonmetallic boxes where exposed rigid PVC conduit is used.
 6. Use suitable concrete type boxes where flush-mounted in concrete.
 7. Use suitable masonry type boxes where flush-mounted in masonry walls.
 8. Use raised covers suitable for the type of wall construction and device configuration where required.
 9. Use shallow boxes where required by the type of wall construction.
 10. Do not use "through-wall" boxes designed for access from both sides of wall.
 11. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 12. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 13. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
 14. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 15. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 16. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
 17. Wall Plates: Comply with Section 26 27 26.
 18. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - e. Thomas & Betts Corporation: www.tnb.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - b. Boxes 6 square feet (0.56 sq m) and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
 6. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.

- b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
 - c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Underground Boxes/Enclosures:
- 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 - 2. Size: As indicated on drawings.
 - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
 - 4. Provide logo on cover to indicate type of service.
 - 5. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
 - b. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 - 6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Manufacturers:
 - 1) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com/#sle.
 - 2) MacLean Highline: www.macleanhigline.com/#sle.
 - 3) Oldcastle Precast, Inc: www.oldcastleprecast.com/#sle.
 - b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

2.02 ACCESSORIES

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for boxes and facade materials to be installed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- G. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.

6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
 8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
 9. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- H. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
 4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch (25 mm) above finished grade.
 4. Provide cast-in-place concrete collar constructed in accordance with Section 03 30 00, minimum 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep), around enclosures that are not located in concrete areas.
 5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 26 05 26.
- Q. Identify boxes in accordance with Section 26 05 53.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 48
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.03 DEFINITIONS

- A. Electrical Component: Where referenced in this section in regards to seismic controls, applies to any portion of the electrical system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., conduit, cable tray).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

- A. ASCE 19 - Structural Applications of Steel Cables for Buildings.
- B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications.
- C. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.
- D. ICC (IBC) - International Building Code.
- E. MFMA-4 - Metal Framing Standards Publication.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- G. NFPA 70 - National Electrical Code.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items, except field quality related items, in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.

1.07 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing electrical equipment and/or electrical connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
 - 1. Select vibration isolators to provide required static deflection.
 - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
- D. Conduit Isolation:
 - 1. Use flexible conduit or cable for electrical connections to vibration-isolated equipment, including equipment installed under other sections or by others.

2.02 SEISMIC RESTRAINT SYSTEMS

- A. Manufacturers:
 - 1. Seismic Restraint Systems:
 - a. AFCON, a brand of Anvil International: www.anvilintl.com/#sle.
 - b. Eaton Corporation: www.eaton.com/#sle.
 - c. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
 - d. Mason Industries: www.mason-ind.com/#sle.
- B. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.
- C. Cable Restraints:
 - 1. Comply with ASCE 19.
 - 2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
 - 3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
 - 4. Use protective thimbles for cable loops where potential for cable damage exists.
- D. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install products in accordance with applicable requirements of NECA 1 (general workmanship).
- C. Secure fasteners according to manufacturer's recommended torque settings.

- D. Install flexible conduit and cable connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
 - 1. Isolator Hangers:
 - a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
 - b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
 - 2. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
 - 3. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
 - 4. Adjust isolators to be free of isolation short circuits during normal operation.
 - 5. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.
- F. Seismic Controls:
 - 1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris or other obstructions.
 - 2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
 - 3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch (3 mm), use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch (3 mm) or less.
 - 4. Equipment with Sheet Metal Housings:
 - a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
 - b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
 - c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
 - 5. Seismic Restraint Systems:
 - a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
 - b. Install restraints within permissible angles in accordance with seismic design.
 - c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
 - d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
 - e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Vibration Isolation Systems:
 - 1. Verify isolator static deflections.
 - 2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- D. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 26 27 26 - Wiring Devices: Device and wall plate finishes; factory pre-marked wall plates.
- C. Section 27 10 00 - Structured Cabling System: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code.
- B. UL 969 - Marking and Labeling Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Submit all items in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- D. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.
- E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 - PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identify electrical equipment with permanently attached phenolic plates with 1/4" white or black engraved lettering on the face of each, attached with two sheet metal screws. Provide nameplate colors as specified in other parts of this section.
- B. Include the following information on panelboard identification plates:
 - 1. Panel Name
 - 2. Voltage and Phase
- C. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number where power originates. Include location when not within sight of equipment.
 - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
 - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
 - 6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - b. Time Switches:
 - 1) Identify load(s) served and associated circuits controlled. Include location.
 - c. Enclosed Contactors:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - 3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 - 4. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- D. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.
 - 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
 - 5. Use underground warning tape to identify direct buried cables.
- E. Identification for Raceways:
 - 1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet (6.1 m).
 - 2. Use underground warning tape to identify underground raceways.

- F. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
- G. Identification for Devices:
 - 1. Wiring Device and Wall plate Finishes: Comply with Section 26 27 26.
 - 2. Use identification label to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
 - 1. Do not use handwritten text.
- E. Minimum Text Height: 1/8 inch (3 mm).
- F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 - 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).
 - 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).
- D. Legend:

1. Markers for Voltage Identification: Highest voltage present.
- E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 1. Tape for Buried Power Lines: Black text on red background.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 1. Materials:
 2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- C. Warning Labels:
 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conduits: Legible from the floor.
 8. Boxes: Outside face of cover.
 9. Conductors and Cables: Legible from the point of access.
 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
 1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Time switches.
- C. Outdoor photo controls.
- D. Daylighting controls.
- E. Lighting contactors.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
- F. Section 26 51 00 - Interior Lighting.
- G. Section 26 56 00 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.
- F. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
- G. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
- H. NFPA 70 - National Electrical Code.
- I. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control.
- J. UL 916 - Energy Management Equipment.
- K. UL 917 - Clock-Operated Switches.
- L. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules.
- M. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
 - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or

- by others.
 - 4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
 - 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
- 1. Do not install lighting control devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items except field quality related items and O/M documentation, in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- D. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
 - 2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.
- E. Field Quality Control Reports.
- F. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Operation and Maintenance Data: Include detailed information on device programming and setup.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Locking Receptacle-Mounted Outdoor Photo Controls: Five percent of total quantity installed for each type, but not less than two of each type.
- I. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.
- C. Provide five year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.
- D. Provide two year manufacturer warranty for all daylighting controls.

PART 2 - PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 3. Sensor Switch Inc: www.sensorswitch.com/#sle.
 - 4. WattStopper: www.wattstopper.com/#sle.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 - 5. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 - 6. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
- C. Wall Switch Occupancy Sensors:
 - 1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

2.03 TIME SWITCHES

- A. Digital Electronic Time Switches:
 - 1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
 - 2. Program Capability:

- a. 24-Hour Time Switches: Single channel, with same schedule for each day of the week and skip-a-day feature to omit selected days.
3. Schedule Capacity: Not less than 8 programmable on/off operations.
4. Provide automatic daylight savings time and leap year compensation.
5. Provide power outage backup to retain programming and maintain clock.
6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
7. Provide remote photocell input with light level adjustment.
8. Input Supply Voltage: 120 V ac unless otherwise indicated.
9. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 1.
 - b. Outdoor locations: Type 3R.

2.04 OUTDOOR PHOTO CONTROLS

- A. Button Type Outdoor Photo Controls
 1. Description: Direct-wired photo control unit complying with ANSI C136.24 with weatherproof gasketed wall plate where required or indicated, listed and labeled as complying with UL 773A.
 2. Housing: Weather resistant polycarbonate.
 3. Photo Sensor: Cadmium sulfide.
 4. Light Level Activation: 1 to 3 footcandles (10.8 to 32.3 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
 5. Voltage: As required to control the load indicated on the drawings.
 6. Failure Mode: Fails to the on position.
 7. Load Rating: As required to control the load indicated on the drawings.

2.05 DAYLIGHTING CONTROLS

- A. Manufacturers:
 1. Hubbell Control Solutions: www.hubbell.com/hubbellcontrolsolutions/en/#sle. Hubbell Control Solutions: www.hubbell.com/hubbellcontrolsolutions/en/#sle. Hubbell Control Solutions: www.hubbell.com/hubbellcontrolsolutions/en/#sle.
 2. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 3. Sensor Switch Inc: www.sensorswitch.com/#sle.
 4. WattStopper: www.wattstopper.com/#sle.
- B. System Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls.
- C. Daylighting Control Photo Sensors: Low voltage class 2 photo sensor units with output signal proportional to the measured light level and provision for zero or offset based signal.
 1. Sensor Type: Filtered silicon photo diode.
 2. Sensor Range:
 - a. Indoor Photo Sensors: 5 to 100 footcandles (53.8 to 1,080 lx).
- D. Dimming Photo Sensors: Photo sensor units with integral controller compatible with specified dimming ballasts, for direct continuous dimming of up to 50 ballasts.
- E. Daylighting Control Dimming Modules for Wireless Sensors:
 1. Description: Plenum rated control unit compatible with specified wireless photo sensors and with specified dimming ballasts, for continuous dimming of compatible dimming ballasts in response to changes in measured light levels according to selected settings.
 2. Operation: Unless otherwise indicated, specified load to be continuously brightened as not enough daylight becomes available and continuously dimmed as enough daylight becomes available.
 3. Load to be turned off when available daylight is sufficient to fully dim the load, after the selected time delay.

4. Control Capability: Capable of controlling up to 32 ballasts with up to two separately programmable daylighting zones.

2.06 LIGHTING CONTACTORS

- A. Manufacturers:
 1. ABB/GE: www.electrification.us.abb.com/#sle.
 2. Eaton Corporation: www.eaton.com/#sle.
 3. Rockwell Automation Inc; Allen-Bradley Products; _____:
ab.rockwellautomation.com/#sle.
 4. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
 5. Siemens Industry, Inc; _____: www.usa.siemens.com/#sle.
- B. Description: Magnetic lighting contactors complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; noncombination type unless otherwise indicated; ratings, configurations and features as indicated on the drawings.
- C. Short Circuit Current Rating:
 1. Provide contactors with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Enclosures:
 1. Comply with NEMA ICS 6.
 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 3. Finish: Manufacturer's standard unless otherwise indicated.

2.07 ACCESSORIES

- A. Auxiliary Contacts:
 1. Comply with NEMA ICS 5.
 2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each lighting contactor, minimum.
- B. Control and Timing Relays:
 1. Comply with NEMA ICS 5.
 2. Provide number and type of relays indicated or required to perform necessary functions.
 3. Timing Relays: Electronic.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switch Occupancy Sensors: 48 inches (1.2 m) above finished floor.
 - b. In-Wall Time Switches: 48 inches (1.2 m) above finished floor.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
 - 3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 1. Do not utilize equipment grounding conductor as a current carrying conductor for electronic switching/dimming/sensor devices.
 - 2. Include a grounded (neutral) conductor with switch leg.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.
- G. Provide required supports in accordance with Section 26 05 29.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- I. Identify lighting control devices in accordance with Section 26 05 53.
- J. Occupancy Sensor Locations:
 - 1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
- K. Outdoor Photo Control Locations:
 - 1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
 - 2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
- L. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
- M. Daylighting Control Photo Sensor Locations:
 - 1. Location Adjustments: Do not make adjustments to locations without obtaining approval from the Architect.
 - 2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
 - 3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured

amount of lighting from artificial sources.

- N. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- O. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- P. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.
- Q. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.
- R. Where indicated or required, provide cabinet or enclosure in accordance with Section 26 05 33.16 for mounting of lighting control device system components.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test time switches to verify proper operation.
- E. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- F. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.
- G. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.
- D. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by Architect.
- E. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 COMMISSIONING

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

3.08 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

2. Location: At project site.

END OF SECTION

SECTION 26 21 00
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- D. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- E. Section 26 05 33.13 - Conduit for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 24 16 - Panelboards: Service entrance equipment.
- H. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Allowances:
 - 1. See Section 01 21 00 - Allowances, for allowances affecting this section.

1.04 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.05 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- C. NFPA 70 - National Electrical Code.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with other installers to provide communication lines required for Utility Company meters.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.

- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
 - 2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.07 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Utility Company letter of availability for providing electrical service to project.
- D. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- E. Shop Drawings: Include dimensioned plan views and sections indicating locations and arrangement of Utility Company and service entrance equipment, metering provisions, required clearances, and proposed service routing.
 - 1. Obtain Utility company approval of shop drawings prior to submittal.
- F. Drawings prepared by Utility Company.
- G. Project Record Documents: Record actual locations of equipment and installed service routing.

1.08 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
 - 4. The requirements of the local authorities having jurisdiction.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 - PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility:

**Forked Deer River Park Restroom Facility
Dyersburg, Tennessee**

1. Pad-Mounted Utility Transformers:
 - a. Transformer Pads: Furnished and installed by Contractor per Utility Company requirements.
 - b. Transformers: Furnished and installed by Utility Company.
 - c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - d. Transformer Protective Bollards: Furnished and installed by Contractor per Utility Company requirements.
 - e. Primary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished by Utility Company and installed by Contractor.
 - 3) Conductors: Furnished and installed by Utility Company.
 - f. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 2. Pole-Mounted Utility Transformers:
 - a. Utility Poles: Furnished and installed by Utility Company.
 - b. Transformers: Furnished and installed by Utility Company.
 - c. Transformer Grounding Provisions: Furnished and installed by Utility Company.
 - d. Primary: Furnished and installed by Utility Company.
 - e. Secondary - Underground Service:
 - 1) Conduits: Furnished and installed by Contractor.
 - 2) Conductors: Furnished and installed by Contractor (Service Point at utility pole).
 - f. Secondary - Overhead Service:
 - 1) Conduits/Service Masts: Furnished and installed by Contractor.
 - 2) Conductors: Furnished and installed by Contractor (Service Point at service mast).
 3. Terminations at Service Point: Provided by Utility Company.
 4. Metering Provisions:
 - a. Meter Bases: Furnished by Utility Company and installed by Contractor.
 - b. Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.
 - c. Metering Compartments in Service Entrance Equipment: Furnished and installed by Contractor per Utility Company requirements.
 - d. Metering Transformers: Furnished and installed by Utility Company.
 - e. Wiring Between Metering Transformers and Meters: Furnished and installed by Utility Company.
 - f. Communications Conduits for Meters: Furnished and installed by Contractor per Utility Company requirements.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 31 23 16.13.
- E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 30 00.
- F. Provide required protective bollards in accordance with Utility Company requirements.
- G. Provide required support and attachment components in accordance with Section 26 05 29.
- H. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
- I. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION

**SECTION 26 24 16
PANELBOARDS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 05 73 - Power System Analysis: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.
- F. NEMA PB 1 - Panelboards.
- G. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less.
- H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems.
- I. NFPA 70 - National Electrical Code.
- J. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.
- K. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.
- L. UL 67 - Panelboards.
- M. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.
- N. UL 869A - Reference Standard for Service Equipment.
- O. UL 943 - Ground-Fault Circuit-Interrupters.
- P. UL 1053 - Ground-Fault Sensing and Relaying Equipment.
- Q. UL 1699 - Arc-Fault Circuit-Interrupters.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items except field quality related items and O/M documentation, in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- D. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 2. Include wiring diagrams showing all factory and field connections.
- E. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
- F. Field Quality Control Test Reports.
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- H. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- I. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. ABB/GE: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. Mersen (fusible coordination panels)
- F. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. as suitable for the purpose indicated.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating as indicated on the drawings.
 - 2. Listed series ratings are not acceptable.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.

- b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 - c. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Panelboard Contactors: Where panelboard contactors are indicated, provide electrically operated, mechanically held magnetic contactor complying with NEMA ICS 2.
 - 1. Ampere Rating: Not less than ampere rating of panelboard bus.
 - 2. Short Circuit Current Rating: Not less than the panelboard short circuit current rating.
 - 3. Coil Voltage: As required for connection to control system indicated.
- L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 - 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
 - 2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
 - a. Use zero sequence ground fault detection method unless otherwise indicated.
 - b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
 - c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.
- M. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- N. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Feed-through lugs.
 - 2. Sub-feed lugs.

2.03 PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Products:
 - 1. 120/240 volts, 1-phase, 3-wire: minimum 10,000 AIC rating.
 - a. Eaton Cutler-Hammer type PRL 1a.
 - b. General Electric type AQ.
 - c. Schneider Square D type NQ
 - d. Siemens type P1
 - 2. Substitutions: Not permitted.
- C. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 - 2. Main and Neutral Lug Type: Mechanical.

- D. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Copper.
 - 3. Ground Bus Material: Copper.
- E. Circuit Breakers: Thermal magnetic bolt-on or plug-in type.
- F. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Fronts: Provide door-in-door trim with fully hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 14,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Provide mechanical lugs.
 - b. Provide compression lugs where indicated.
 - c. Lug Material: Copper, suitable for terminating copper conductors only.
 - d. Temperature rating: 75 degree or 60/75 degree.
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 150 amperes and larger, where electronic trip is not required.
 - b. Provide interchangeable trip units for circuit breaker frame sizes 250 amperes and larger, where electronic trip is not required.
 - 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide electronic trip circuit breakers for all breakers 150A frame and larger
 - b. Provide the following field-adjustable trip response settings:
 - 1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - 2) Long time delay.
 - 3) Short time pickup and delay.
 - 4) Instantaneous pickup.
 - 5) Ground fault pickup and delay where ground fault protection is indicated.
 - 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 7. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.

- c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
 - d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
 - e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
- 8. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
 - 9. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
 - 10. Do not use tandem circuit breakers.
 - 11. Do not use handle ties in lieu of multi-pole circuit breakers.
 - 12. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
 - 13. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.

2.05 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Factory test panelboards according to NEMA PB 1.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Provide required seismic controls in accordance with Section 26 05 48.
- G. Install panelboards plumb.
- H. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- I. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- J. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling.
- K. Provide grounding and bonding in accordance with Section 26 05 26.
 - 1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
 - 2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.
- L. Install all field-installed branch devices, components, and accessories.

- M. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- N. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- O. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.
- P. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- Q. Provide filler plates to cover unused spaces in panelboards.
- R. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and any circuit breakers larger than 225 amperes. Tests listed as optional are not required, except for the following:
 - 1. Perform insulation-resistance tests on all control wiring with respect to ground.
 - 2. Test functions of the trip unit by means of secondary injection.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is required.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Test AFCI circuit breakers to verify proper operation.
- G. Test shunt trips to verify proper operation.
- H. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
- I. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates and covers.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 05 33.16 - Boxes for Electrical Systems
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 09 23 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices.
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications.
- G. NFPA 70 - National Electrical Code.
- H. UL 20 - General-Use Snap Switches.
- I. UL 498 - Attachment Plugs and Receptacles.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices.
- K. UL 943 - Ground-Fault Circuit-Interrupters.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
 - 6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items except field quality related items and O/M documentation, in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data:
 - 1. GFCI Receptacles: Include information on status indicators.
- F. Project Record Documents: Record actual installed locations of wiring devices.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
 - 3. Extra Keys for Locking Switches: Two of each type.
 - 4. Extra Wall Plates: One of each style, size, and finish.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant devices for 15- and 20- amp, 125- and 250V devices as required per NEC 406.12.
- E. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.

- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.03 WALL SWITCHES

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable FS W-S-896; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wall plates by the same manufacturer in locations indicated.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498 and where applicable FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 2. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 3. Tamper Resistant and Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

4. Tamper Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

2.05 WALL PLATES AND COVERS

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wall plates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
 1. Mounting Heights: As indicated on the drawings.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.

- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 1. Do not utilize equipment grounding conductor as a current carrying conductor for electronic switching/dimming/sensor devices.
 - 2. Include a grounded (neutral) conductor with switch leg.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Install in-line GFCI devices in flush enclosure, adjacent to and matching finish of the panelboards serving the associated circuit. Coordinate placement with equipment in the area to ensure proper working clearances are maintained.
- M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- P. Identify wiring devices in accordance with Section 26 05 53.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

**SECTION 26 51 00
INTERIOR LIGHTING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Drivers and power supplies.
- E. Emergency power supply units.
- F. Accessories.

1.02 SCOPE OF WORK

- A. Furnish and install a lighting fixture of the type indicated by designator at each location shown on the drawings. All materials, accessories, components and any other equipment necessary for the complete and proper installation and operation of the lighting fixtures shall be furnished by the Contractor, including those not usually indicated on the drawings or specified, but that are necessary for the proper installation and operation of the fixtures.
- B. Specifications and drawings are intended to convey the main features, function, and character of the fixtures only, and do not necessarily illustrate or set forth every item or detail necessary for completion of the work.
- C. Where design intent is unclear in the documents, the Contractor shall contact the Architect in writing for clarification prior to proceeding with the item in question.
- D. Where Contractor's BIM is used to produce, document, or otherwise coordinate the locations of lighting fixtures, it is the Contractor's responsibility to confirm that all lighting products to be provided for construction will fit into the intended locations.

1.03 RELATED REQUIREMENTS

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- D. Section 26 09 23 - Lighting Control Devices.
- E. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.
- F. Section 26 56 00 - Exterior Lighting.

1.04 REFERENCE STANDARDS

- A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code).
- B. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information.
- C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products.
- D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- F. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems.
- G. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems.
- H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts.
- I. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility.

- J. NFPA 70 - National Electrical Code.
- K. NFPA 101 - Life Safety Code.
- L. UL 924 - Emergency Lighting and Power Equipment.
- M. UL 1598 - Luminaires.
- N. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.
- O. ASHRAE/IESNA Standard 90.1 - Energy Standard for Buildings (current version or most recent approved version by the local authority.)
- P. IECC - International Energy Conservation Code (current version or most recent approved version by the local authority.)

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submittals shall be submitted for review for all lighting fixtures, lamps (as applicable), drivers/ballasts/power supplies (as applicable) in accordance with the requirements of the Contract Documents. Shop drawing submittals for multiple types must be submitted with a contents page listing each fixture by type designation with manufacturer, model number, lamp model number (as applicable), driver/ballast/power supply (as applicable.) Individual catalog cuts or drawings shall include complete fixture model numbers. Catalog cuts or drawings lacking sufficient detail to indicate compliance with Contract Documents will not be acceptable. The contents page, catalog cut sheets and custom shop drawings shall be arranged in alphanumeric order by fixture type designation. Submittals lacking organization may be rejected without review.
- C. Review of shop drawings or samples does not waive contract requirements. Review of the shop drawings, submittals or samples does not relieve the Contractor from responsibility for deviations from the specifications or drawings, unless a letter is provided noting such deviations at the time of submission and received written acceptance for such deviations from the Architect and/or the Lighting Designer. Approval of shop drawings or samples does not relieve the Contractor from responsibility for errors in the shop drawings or samples. Contractor shall be fully responsible for lighting fixtures that are manufactured or installed without reviewed shop drawings and for fixtures not manufactured in accordance with the requirements of the Architect and/or the Lighting Designer shop drawing review to the extent that they may need to be removed and replaced entirely.
- D. The design team reserves the right to make minor modifications to the specifications at the time of submittal review such that there is either no change in cost or any cost changes can be carried by a contingency or as otherwise acceptable to the Owner.
- E. Preliminary lighting controls submittals shall be submitted simultaneously with lighting fixtures indicating compatibility between the fixture type control method, driver type, load, and control method.

- F. The Contractor shall identify any long lead time or lighting fixture delivery issues that may adversely affect the project schedule, and immediately bring them to the attention of the Owner, Architect and/or Lighting Designer. The Contractor shall provide all products to the jobsite on time. Under no circumstances shall the Contractor delay the release of any submittals to the design team for review and approval such that any delay would compromise the project schedule or instigate a need for a product substitution. Allow a minimum of 10 weeks for the delivery of standard products, and 20 weeks for custom products. Also, allow a minimum of 2 weeks for any subsequent submittal review by the design team and up to 3 weeks for the initial review of the complete lighting package.
- G. Photometric Data:
 - 1. Provide complete photometric data for lighting fixtures produced in accordance with methods of Illuminating Engineering Society of North America.
 - 2. Upon request, provide illumination level calculation for typical areas or for areas where specialty fixtures are used.
- H. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
 - 3. For architecturally integrated lighting fixtures, verify field dimensions and include them on shop drawings showing exact locations of fixtures. Where applicable, shop drawings shall include wiring diagrams, scale plans and details showing the method of installation of components, mounting hardware, secondary feeds, as well as a complete bill of materials. Changes to shop drawings by the manufacturer or Contractor are to be 'clouded' and dated prior to resubmission. No variation from the general arrangement and details indicated in the Contract Documents shall be made on the shop drawings, unless required to suit the actual conditions on the premises, and then only with the written acceptance of the Architect and/or Lighting Designer. All variations must be clearly marked as such on drawings submitted for review.
- I. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 - c. Include electrical characteristics: input voltage in volts, input current in amps, input power in watts.
 - d. Include data for total light output in lumens, luminaire efficacy in lumens per watt
 - e. Include power supply, thermal, optical and fixture losses.
 - 2. LED Drivers: Include wiring diagram and list of compatible source units.
 - 3. Lamps/source module: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
 - 4. Emergency Power Supply Unit: Include list of compatible lamp/source configurations and associated lumen output.
- J. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements.
- K. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
 - 1. Field quality control reports
- L. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

- M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
- N. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of five years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide a minimum of five years of manufacturer warranty for LED luminaires, including drivers.
- C. Provide five year pro-rata warranty for batteries for emergency lighting units.
- D. Provide ten year pro-rata warranty for batteries for self-powered exit signs.
- E. Provide five year full warranty for emergency power supply units.

PART 2 - PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - a. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - b. Agrees to provide the same warranty for the substitution as for the specified product.
 - c. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - d. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 2. Any substitutions inserted into a submittal package may be rejected on an individual basis or at the discretion of the design team, may invalidate the entire submittal. Any substitution may be rejected without review or consideration, at any time.
 - 3. Under special circumstances, as authorized by the Owner, Architect, or Lighting Designer, substitution proposals may be requested from the Contractor for the purpose of cost reduction. Such proposals shall include individual unit prices for the specified products

and for the proposed substitutions. Distributor and Contractor markup costs shall also be disclosed in the proposal. Any differences in installation costs for proposed substitutions shall also be provided.

2.02 LUMINAIRES

- A. Manufacturers:
 - 1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc: www.hubbellighting.com/#sle.
 - 4. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, sources, drivers, power supplies, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
- I. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- J. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
 - 1. LED Tape - General Requirements:
 - a. Listed.
 - b. Designed for field cutting in accordance with listing.
 - c. Wet Location Applications: IEC 60529, IP 68 (waterproof) rated.
- K. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

- A. Manufacturers:
 - 1. Acuity Brands, Inc; _____: www.acuitybrands.com/#sle.
 - 2. Cooper Lighting, a division of Cooper Industries; _____: www.cooperindustries.com/#sle.
 - 3. Hubbell Lighting, Inc; _____: www.hubbellighting.com/#sle.
- B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

- D. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- F. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.
- B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
 - 1. Self-Powered Exit Signs:
 - a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - b. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - c. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.05 BALLASTS AND DRIVERS

- A. Manufacturers:
 - 1. Alloy LED; www.alloyled.com/#sle.
 - 2. General Electric Company/GE Lighting; www.gelighting.com/#sle.
 - 3. Lutron Electronics Company, Inc; www.lutron.com/#sle.
 - 4. OSRAM Sylvania, Inc; www.osram.us/ds/#sle.
 - 5. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- C. LED Drivers:
 - 1. Manufacturer limitations: All LED drivers shall be supplied by the light fixture manufacturer and specifically paired with each light source so that the LED driver combination will operate per published performance, and is compatible with control method indicated. Where possible, all fixture drivers shall be of the same family/series and shall be supplied by a single manufacturer.
 - 2. General Requirements:
 - a. Driver shall operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
 - b. For some LED fixture, remote drivers are required.
 - 1) It is the contractor responsibility to properly size and otherwise 'engineer' the complete LED system to account for wire size, voltage drop, ambient conditions (dry/wet, temperature, dimmability, etc.)
 - 2) Each manufacturer should be contacted regarding confirmation of final installation details and arrangements. Contract documents may or may not indicate anticipated locations for remote drivers, but final locations will be subject to field conditions and are the responsibility of the contractor.
 - c. Wherever available, provide dual voltage (120/277V) driver units.

- d. Integral thermal protection to automatically reduce power output to protect LED drive and LED light engine/fixture from damage due to over-temperature conditions that exceed the LED driver's maximum operating temperature at the calibration point.
 - e. Drivers shall be designed and tested to withstand electrostatic discharges incurred during manufacturing, installation, or field troubleshooting without impairment of performance when tested according to IEC 61000-4-2.
 - f. Drivers shall be designed and tested to withstand Category A surges of 4,000V according to IEEE C62.41.2 without impairment of performance.
 - g. Drivers shall be Class A sound rating, inaudible in a 27 dBA ambient noise condition.
 - h. Meet NEMA 410 inrush requirements for mitigating inrush currents with solid state lighting sources.
3. Dimming Range: Refer to LIGHTING FIXTURE SCHEDULE. Where dimming range is not indicated, request clarification from the architect prior to submitting bid. As a minimum, ten percent relative light output unless dimming capability to lower level is indicated, without flicker.
 4. Control Compatibility: Fully compatible with the dimming controls to be installed.
 5. Product(s):
 - a. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

2.06 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Provide required seismic controls in accordance with Section 26 05 48.

- G. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- H. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 5. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
 - 6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- I. For fixtures weighing 56 pounds or more in Seismic Design Categories D, E, or F, provide four galvanized steel safety wire(s), minimum 12 gauge, connected from each corner of each recessed luminaire to building structure.
- J. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- K. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- L. Install accessories furnished with each luminaire.
- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.
- O. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.
- P. Burn-In: Operate fixtures at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps/sources that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

**SECTION 26 56 00
EXTERIOR LIGHTING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- D. Section 26 09 23 - Lighting Control Devices.
- E. Section 26 51 00 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information.
- B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products.
- C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction.
- E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems.
- F. NFPA 70 - National Electrical Code.
- G. UL 1598 - Luminaires.
- H. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit all items except field quality related items and O/M documentation, in a single, comprehensive package for review. Individual submissions for each line item will not be accepted.
- C. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
 - 3. Provide structural calculations for each pole proposed for substitution.
- D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
3. Lamps: Include rated life and initial and mean lumen output.
- E. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements.
- F. Field Quality Control Reports.
 1. Include test report indicating measured illumination levels.
- G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- H. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- I. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 - PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LUMINAIRES

- A. Manufacturers:
 1. Acuity Brands, Inc; _____: www.acuitybrands.com/#sle.
 2. Alloy LED; _____; www.alloyled.com/#sle.
 3. Cooper Lighting, a division of Cooper Industries; _____: www.cooperindustries.com/#sle.
 4. Electro-Matic Visual, Inc; _____; www.empvisual.com/#sle.
 5. Hubbell Lighting, Inc; _____: www.hubbellighting.com/#sle.

6. Philips Lighting North America Corporation; _____;
www.lightingproducts.philips.com/#sle.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Provide products that comply with requirements of NFPA 70.
 - C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
 - D. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
 - E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
 - F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
 - G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
 - H. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
 - I. LED Luminaires:
 1. Components: UL 8750 recognized or listed as applicable.
 2. Tested in accordance with IES LM-79 and IES LM-80.
 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
 - J. LED Luminaire Components: UL 8750 recognized or listed as applicable.
 - K. Exposed Hardware: Stainless steel.

2.03 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires in accordance with NECA/IESNA 501.

- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- H. Install accessories furnished with each luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.
- E. Measure illumination levels at night with calibrated meters to verify compliance with performance requirements. Record test results in written report to be included with submittals.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

3.06 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

**SECTION 31 23 16.13
TRENCHING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 22 00 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.03 REFERENCE STANDARDS

- A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)).

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. General Fill: Subsoil excavated on-site.
 - 1. Free of lumps larger than 3 inches (75 mm), rocks larger than 2 inches (50 mm), and debris.
- B. Topsoil: Topsoil excavated on-site.
 - 1. Free of roots, rocks larger than 1/2 inch (12 mm), subsoil, debris, large weeds and foreign matter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Protect plants, lawns, rock outcroppings, and other features to remain.
- F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.03 TRENCHING

- A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove excavated material that is unsuitable for re-use from site.

- H. Remove excess excavated material from site.
- I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.
- J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.04 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- F. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- G. Compaction Density Unless Otherwise Specified or Indicated:
- H. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Utility Piping, Conduits, and Duct Bank and _____:
 - 1. Bedding: Use general fill.
 - 2. Cover with general fill.
 - 3. Fill up to subgrade elevation.
 - 4. Compact in maximum 8 inch (200 mm) lifts to 95 percent of maximum dry density.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Frequency of Tests: _____.

3.08 CLEANING

- A. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.