City of Dublin

RE-BID
DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS PROJECT #16-002.1-FAC

BIDS DUE:

May 26, 2016

2:00 p.m.

6555 Shier Rings Road

Dublin, Ohio 43016

CITY OF DUBLIN, OHIO

RE-BID AND CONTRACT DOCUMENTS

For

Dublin Community Recreation Center Pool Renovations

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SECTION 1
BIDDING REQUIREMENTS

INVITATION TO RE-BID

Project Name: Dublin Community Recreation Center Pool Renovations

The City of Dublin, Ohio is seeking bids from contractors for a project known as the Dublin Community Recreation Center Pool Renovations. This project consists of:

> All the materials and labor necessary to remove existing pool level Auto-fill system, pool perimeter trench drains and underwater pool lighting replacing with new in the same locations.

Bids must be submitted in sealed envelopes plainly marked CITY OF DUBLIN – Project Name: **Dublin Community Recreation Center Pool Renovations** and must be addressed to Tim Elmer, Operations Administrator, City of Dublin, 6555 Shier Rings Road, Dublin, Ohio 43016. Bids must be submitted no later than **2:00 p.m. (local time) on May 26, 2016** and will be publicly opened at that time at the address above. This is an Ohio Prevailing Wage Rate contract. The contractor and ALL subcontractors shall be required to submit Certified Payrolls.

The Engineer's Base Bid Estimate is $230,500.00.
The Engineer's Alternate 1 Bid Estimate is $80,500.00.

A certified check, bank draft or a satisfactory bid bond in an amount equal to five percent (5%) of the estimated cost of said construction services shall be submitted with each bid.

The successful bidder will be required to furnish and pay for satisfactory performance and payment bonds in the amount of one-hundred percent (100%) each in the total amount of the bid.

A pre-bid meeting will be held on May 19, 2016 at 1:00 p.m. at the Dublin Recreation Center, Classroom A/B, 5600 Post Road, Dublin, Ohio 43017.

Bid specifications and documents may be obtained at AlphaGraphics, 1254 Courtland Ave., Columbus OH 43201 or reviewed at Osborn Engineering, 990 W Third Avenue Suite 200, Columbus, Ohio 43212 beginning Wednesday, April 20, 2016**.** Copies can be purchased at a charge of seventy-five dollars ($75.00) per set. Documents are available online at http://dublinohiousa.gov/bids-and-requests-for-proposals/. When downloading bid documents from online you must register as a planholder to receive any addendums that may be issued.

THE CITY OF DUBLIN RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS

ODOT Pre-qualification

NOT APPLICABLE _X___

Bidders are required to be pre-qualified with the Ohio Department of Transportation. Bidders must present a current approved copy of ODOT Pre-qualification at the time proposals are picked up from City Engineer's Office.

General Specifications

NOT APPLICABLE ____

The general specifications for the Project are the following (as all are in effect at time of awarding of the contract):

1). City of Dublin, Ohio Streets and Highways General Provisions

2). Sections 200 through 1000 of the *Construction and Material Specifications of the City of Columbus, Ohio,* and

3). Sections 200 through 700 of the *Construction and Material Specifications of the State of Ohio Department of Transportation*

Copies of the *Construction and Material Specifications of the City of Columbus, Ohio* may be obtained from:

Director of Public Service
City of Columbus, Ohio
90 W. Broad Street, 3rd Floor
Columbus, Ohio

Copies of the *Construction and Material Specifications of the State of Ohio Department of Transportation* may be obtained from:

Ohio Department of Transportation
Bureau of Contract Sales
P.O. Box 899
Columbus, Ohio 43216-0899

Contract Documents

The contract documents will be available for examination during regular business hours until the date of bid opening at:

Osborn Engineering
990 West Third Ave. Suite 200
Columbus, OH 43212

Copies of the contract documents may be obtained upon request accompanied by a non-refundable deposit in the amount of **$75.00** for each set of contract documents. Checks shall be made payable to "the Osborn Engineering Company" The contract documents may be obtained from:

Osborn Engineering
990 West Third Ave. Suite 200
Columbus, OH 43212

Prevailing Wages

APPLICABLE X NOT APPLICABLE ____

Bidders shall comply with Chapter 4115 of the Ohio Revised Code (Wages and Hours on Public Works). Bidders are responsible for verifying that the most current wage rates are utilized in their bids. The successful bidder is also responsible for any changes in the prevailing wage rates or classifications throughout its performance of work on the Project.

Bids and Attached Documents

Bidders shall submit their bids on the form of proposal provided by the City of Dublin.

Each proposal shall be submitted in its entirety in a sealed envelope addressed to:

Tim Elmer
Operations Administrator
City of Dublin, Ohio
6555 Shier Rings Road
Dublin, Ohio 43016

Each sealed envelope containing a proposal shall be plainly marked on the outside as – "Re-Bid for:
DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS."
The envelope shall bear the name and address of the bidder.

If forwarded by mail, the sealed envelope containing the proposal must be enclosed in another envelope and the outside of the envelope must be addressed to and marked:

Tim Elmer
Operations Administrator
City of Dublin, Ohio
6555 Shier Rings Road
Dublin, Ohio 43016

BID FOR: **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS**

Bidders shall submit the following with their proposals:

1. Non-collusion Affidavit.
2. Bid Guaranty.
3. List of Subcontractors if applicable.
4. Delinquent Personal Property Tax Affidavit.
5. Affidavit of Authority (if Bidder is a corporation).
7. Experience Record/References.
8. Power of Attorney (if Bidder is an out-of-state corporation).

The City of Dublin, Ohio reserves the right to reject any and all proposals and to waive any informalities or irregularities in the proposals.

Bidders may address technical inquiries to:

Bryan Lundgren
Osborn Engineering
990 West Third Ave. Suite 200
Columbus, OH 43212
Phone: 614-556-4272
Email: blundgren@osborn-eng.com

By order of the City Council of the City of Dublin, Ohio.
CITY OF DUBLIN, OHIO
Dana L. McDaniel
City Manager

INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

Immediately notify **Bryan Lundgren** upon finding discrepancies or omissions in the bidding documents.

Direct general inquiries and questions to Bryan Lundgren, Osborn Engineering at 614-556-4272 or blundgren@osborn-eng.com.

1. Submit written request for clarification, correction or interpretation to the Architect not less than 7 days before the date for receipt of bids.

2. Modifications to the bidding documents will be issued as Addenda to the specifications and will become a part of the Contract.

3. No bidder shall rely on oral modifications or any other method of clarification, correction or interpretation of the bidding documents. Only modifications set forth in an Addendum will be binding.

PREVAILING WAGE DISKETTE

SECTION 2
BIDDING FORMS

PROPOSAL
Dublin Community Recreation Center
Pool Renovations

_____ (the "Bidder") submits this Proposal having read and examined the contract documents, including but not limited to the Invitation to Bid; the City of Dublin, Ohio

All bids will be based upon elements indicated within the Drawings and Specifications. All changes to actual length, either additions or subtractions, will be through Change Order(s) using unit price(s) provided by contractor on proposal form.

Addenda Number	Date of Receipt
_____	_____
_____	_____
_____	_____

The Bidder proposes to provide the above named **Dublin Community Recreation Center Pool Renovations** in accordance with the contract documents for the following sum:

Total Base Bid (in figures): $ _____

Total Base Bid (in words): $ _____

_____

Bid Alternate No. 1 – Leisure Pool Trench Drain Replacement

Bid Alternate No.1 – Add/Deduct (in figures): $_____

Bid Alternate No.1 – Add/Deduct (in words): $_____

_____

Unit Price: Include cost per linear foot to trench and provide new conduit if existing cable breaks during attempt(s) to pull it out of existing conduit, during demolition, $_____/per ft.

The Bidder understands and agrees that delivery under the Agreement for **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS CENTER** shall be complete **sixty (60) consecutive calendar days,** or as specified in bid documents unless an extension of time is granted by the City of Dublin.

Upon failure to have all work completed within the project time, the City of Dublin, Ohio shall be entitled to retain or recover from the Bidder, as liquidated damages, and not as a penalty, the amounts set forth in the following table for each and every calendar day until completion. The right of the City of Dublin, Ohio to recover liquidated damages shall not substitute for any recovery for additional costs in the event the Bidder fails to complete the Agreement for construction according to the contract documents.

Liquidated Damages:

Contract Amount	Dollars Per Day
$0-25,000	$ 100.00
25,001-50,000	150.00
50,001-100,000	200.00
100,001-500,000	300.00
500,001-1,000,000	500.00
1,000,001-2,000,000	750.00
2,000,001-5,000,000	1,000.00
5,000,001-10,000,000	1,500.00
Over $10,000,001	2,000.00

REPRESENTATIONS OF THE BIDDER

The Bidder represents the following:

1. The Bidder has read and understands the contract documents and understands that it must comply with all requirements of the contract documents, regardless of whether the Bidder has actual knowledge of the requirements and regardless of any statement or omission made by the Bidder which might indicate a contrary intention.

2. The Proposal is based upon the items specified by the contract documents.

3. The Bidder has visited the site, become familiar with local conditions, and has correlated personal observations about the requirements of the contract documents. The Bidder has no outstanding questions regarding the interpretation of the contract documents.

4. The Bidder has submitted the following in connection with this Proposal and the information contained therein is complete and accurate:

   a. Non-collusion Affidavit.

   b. Bid Guaranty.

   c. List of Subcontractors.

   d. Delinquent Personal Property Tax Affidavit.

   e. Affidavit of Authority (if Bidder is a corporation).

   g. Experience Record/References.

   h. Power of Attorney (if Bidder is an out-of-state corporation).

6. The Bidder understands that the Agreement for **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS** is subject to all of the provisions, duties, obligations, remedies and penalties of Ohio Revised Code Chapter.

7. Within ten (10) business days from the date of receipt the Notice of Intent to Award, the Bidder understands that it must enter into and execute an Agreement for **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS** with the City of Dublin, Ohio if awarded on the basis of this Proposal. If the Bidder does not execute an Agreement for **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS** for any reason, the Bidder and the Bidder's surety shall be liable to the City of Dublin, Ohio as provided in Ohio Revised Code Section 153.54(G).

8. Within ten (10) business days of the date of receipt of the Notice of Intent to Award, the Bidder understands that it must submit the following:

   a. Performance Bond.
   b. Certificate of Insurance and a copy of Additional Insured Endorsement.

9. The Bidder understands that it must furnish any other information requested by Tim Elmer, the Operations Manager, City of Dublin.

The Bidder hereby signs this Proposal on the ___ day of _____, **2016**.

If Bidder is an individual, complete the following:

Signature: _____

Print Name: _____

Name of Business: _____
(if different than above)

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

If Bidder is a partnership, complete the following:

Name of Partnership: _____

By: _____
(Signature)

Print Name: _____

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

Names and Addresses of all general partners:

_____

_____

_____

If Bidder is a joint venture, complete the following:

Name of Joint Venture: _____

By: _____
(Signature)

Print Name: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

Complete the following for each firm represented by the joint venture:

1. Name: _____

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

2. Name: _____

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

If Bidder is a corporation, complete the following:

Name of Corporation: _____

By: _____
(Signature)

Print Name: _____

Title: _____

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

State of Incorporation: _____

Names and addresses of Corporate Officers:

_____

_____

_____

If Bidder is an entity other than those described above, complete the following:

Name of Bidder:

By: _____
(Signature)

Print Name: _____

Title: _____

Federal Identification Number: _____

Address: _____

_____

Telephone: ( ) _____

Fax: ( ) _____

Type of Business Entity: _____

Names and addresses of all Principals:

_____

_____

_____

_____

_____

BID BOND

DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____ (the "Principal") and _____ (the "Surety") are herby held and firmly bound unto the City of Dublin, Ohio ("Dublin") as obligee in the penal sum of the dollar amount of the bid submitted by the Principal to Dublin on _____, **2016** to undertake the project known as:

DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

The penal sum referred to herein shall be the dollar amount of the Principal's bid to Dublin, incorporating any additive or deductive alternate proposals made by the Principal on the date referred to above to Dublin, which are accepted by Dublin. In no case shall the penal sum exceed the amount of _____ dollars ($ _____). (If the foregoing blank is not filled in, the penal sum will be the full amount of the Principal's bid, including alternates. Alternatively, if the blank is filled in, the amount stated must not be less than the full amount of the bid including alternates, in dollars and cents. A percentage is not acceptable.)

For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above-named Principal has submitted a bid for **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS.**

NOW, THEREFORE, if Dublin accepts the bid of the Principal and the Principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the Principal pays to Dublin the difference not to exceed five percent of the penalty hereof between the amount specified in the bid and such larger amount for which Dublin may in good faith contract with the next lowest bidder to perform the work covered by the bid, or in the event Dublin does not award the contract to the next lowest bidder and resubmits the project for bidding, the Principal will pay Dublin the difference not to exceed five percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract documents, required advertising and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; if Dublin accepts the bid of the Principal and the Principal within ten days after the awarding of the contract, enters into a proper contract in accordance with the bid, plans, details specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein.

NOW ALSO, if the Principal shall well and faithfully do and perform the things agreed by Principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, material men, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any material man or laborer having a just claim, as well as for Dublin herein; then this obligation shall be void; otherwise the same shall remain in full 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 hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of said contract or in or to the plans or specifications therefore shall in any wise affect the obligations of the Surety on the Surety's bond, and the Surety does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the plans or specifications.

Signed this _____ day of _____, **2016**.

PRINCIPAL:

_____

By: _____
(Signature)

Print Name: _____

Title: _____

Address:

_____

_____

Telephone: ( ) _____

SURETY:

_____

By: _____
(Signature)

Print Name: _____

Title: _____

Address:

_____

_____

Telephone: ( ) _____

SURETY AGENT:

_____

By: _____
(Signature)

Print Name: _____

Title: _____

Address:

_____

_____

Telephone: ( ) _____

DELINQUENT PERSONAL PROPERTY TAX AFFIDAVIT
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

STATE OF _____
COUNTY OF _____, SS:

I, _____ (Affiant), _____ (Title) of _____ (the "Bidder"), after being cautioned and sworn, represent to the City of Dublin, Ohio, the following: (check the appropriate statement)

At the time the Proposal was submitted, the Bidder was not charged with delinquent personal property taxes on the General Tax Lists of Personal Property of a county in which the City of Dublin, Ohio has territory (Franklin, Delaware, and Union Counties).

OR

At the time the Proposal was submitted, the Bidder was charged with delinquent personal property taxes on the General Tax Lists of Personal Property of a county in which the City of Dublin, Ohio has territory (Franklin, Delaware, and Union Counties) and that the amounts of such due and unpaid delinquent taxes, including due and unpaid penalties and interest, are set forth below:

Taxes:	Penalties and Interest:	Counties:
$_____	$_____	_____
$_____	$_____	_____
$_____	$_____	_____

_____
(Signature of Affiant)

_____
(Print Name)

Sworn to and subscribed before me this ____ day of _____ **2016**.

_____
Notary Public

NONCOLLUSION AFFIDAVIT
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

STATE OF _____
COUNTY OF _____, SS:

I, _____ (Affiant), _____ (Title) of _____ (the "Bidder"), after being cautioned and sworn, represent to the City of Dublin, Ohio the following:

1. The bid price contained in the Bidder's Proposal for the Project has been arrived at independently without collusion, consultation, communication, or agreement for the purpose of restricting competition as to any matter relating to such bid price with any other bidder or third party.

2 Unless otherwise required by law, neither the bid price nor the Proposal has been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other bidder or to any third party that would have any interest in the bid price.

3 No attempt has been made or will be made by the Bidder to induce any other individual, partnership, or corporation to submit or not to submit a bid for the purpose of restricting competition.

_____
(Signature of Affiant)

_____
(Print Name)

Sworn to and subscribed before me this ___ day of _____, 2016

_____
Notary Public

AFFIDAVIT OF AUTHORITY
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

STATE OF _____
COUNTY OF _____, SS:

I, _____ (Affiant), after being cautioned and sworn, state the following:

1. I am the Secretary of _____ (the "Company"), a corporation organized and existing under the laws of the State of _____.

2. I am familiar with the records of the Company.

3. _____ (name of officer) is authorized to sign the Proposal and to execute a contract on behalf of the Company for the above-referenced project.

_____
(Signature of Affiant)

_____
(Print Name)

Sworn to and subscribed before me this _____ day of _____, **2016**

_____
Notary Public

LIST OF SUBCONTRACTORS
Not Applicable ____
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

NOTE: The bidder must perform at least 25% of the total contract cost with its own forces.

Complete the following information for all subcontractors, which will be employed on the Project.

1. Name of Subcontractor:_____

Federal Identification Number: _____

Address: _____

_____

Type of Work
Subcontractor to Provide:_____

Approximate Percentage of the Contract
Cost to be Performed by Subcontractor: _____

Experience Record: _____

2. Name of Subcontractor: _____

Federal Identification Number: _____

Address: _____

_____

Type of Work
Subcontractor to Provide: _____

Approximate Percentage of the Contract
Cost to be performed by Subcontractor: _____

Experience Record: _____

3. Name of Subcontractor: _____

Federal Identification Number: _____

Address: _____

_____

Type of Work
Subcontractor to Provide: _____

Approximate Percentage of the Contract
Cost to be performed by Subcontractor: _____

Experience Record: _____

4. Name of Subcontractor: _____

Federal Identification Number: _____

Address: _____

_____

Type of Work
Subcontractor to Provide: _____

Approximate Percentage of the Contract
Cost to be performed by Subcontractor: _____

Experience Record: _____

5. Name of Subcontractor: _____

Federal Identification Number: _____

Address: _____

_____

Type of Work
Subcontractor to Provide: _____

Approximate Percentage of the Contract
Cost to be performed by Subcontractor: _____

Experience Record:_____

EXPERIENCE RECORD/REFERENCES
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

NOTE: Bids from contractors inexperienced in this particular type of work will not be considered.

Complete the following information with respect to previous purchasers.

1. Name of Person to
Contact for Reference: _____

Address: _____

_____

Phone: ( )_____

2. Name of Person to
Contact for Reference: _____

Address: _____

_____

Phone: ( )_____

3. Name of Person to
Contact for Reference: _____

Address: _____

_____

Phone: ( )_____

SECTION 3
CONTRACT FORMS

NOTICE OF INTENT TO AWARD

POOL RENOVATIONS
DUBLIN RECREATION CENTER

To: _____

_____

_____

You are hereby notified that the City of Dublin, Ohio has accepted the Proposal submitted by you on_____, **2016** in response to the Invitation to Bid for the above-referenced project.

Within ten (10) business days from the date of receipt of this Notice of Award, you are required to:

1. Execute an Agreement for Construction.

2. Submit a Performance Bond.

3. Submit a Certificate of Insurance and a copy of an Additional Insured Endorsement.

4. Submit an Affirmative Action Certificate of Compliance.

If you fail to execute the Agreement for construction or provide the required submittals within ten (10) business days from the date of receipt of this Notice of Intent to Award, you or your surety shall be liable to the City of Dublin, Ohio as provided in Ohio Revised Code Section 153.54(G) and the City of Dublin, Ohio may award the contract to the next lowest and best bidder.

You are required to prepare and submit a progress schedule prior to the pre-construction conference to be held on **July 11, 2016** **Not Applicable** _____

Return an acknowledged copy of this Notice of Intent to Award to:

Tim Elmer, Operations Administrator
City of Dublin
6555 Shier Rings Road
Dublin, Ohio 43016

CITY OF DUBLIN, OHIO

Date: _____ By:_____

Tim Elmer
Operations Administrator

RECEIPT OF NOTICE OF INTENT TO AWARD

Receipt of this Notice of Intent to Award is hereby acknowledged this ___ day of _____, **2016.**

Company Name: _____

Signature: _____

Print Name: _____

Title: _____

Contract No: _____

STANDARD AGREEMENT
CITY OF DUBLIN, OHIO

This Agreement is entered into this _____ day of _____, 20____, by and between the City of Dublin, Ohio (**DUBLIN**), the Owner, located at 5200 Emerald Parkway, Dublin, Ohio 43017, and the

SERVICE PROVIDER

_____

_____

_____

For services in connection with:

All the materials and labor necessary to replace roofing systems and related work.

FOR THE FOLLOWING:

DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS

The **ENGINEER** of the Project is

Osborn Engineering
990 West Third Ave., Suite. 200
Columbus, OH 43212

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES. CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS EXECUTION, COMPLETION AND MODIFICATION.

CONTRACT DOCUMENTS

This Agreement is for performance of a portion of the Work for the Project identified above. All Work by Service Provider shall be performed in accordance with the Contract Documents. The Contract Documents comprise of and include this Agreement, General and Supplemental Conditions, Plans and Specifications, Project Manuals and all amendments thereto. These Contract Documents are hereby specifically incorporated herein as part of this Agreement and shall govern the Service Provider for his portion of the Work related to the Project.

Service Provider shall furnish all materials, supplies, equipment, and other items proper or necessary to perform and complete the Work, including specifically providing all supervision and labor required for the completion of the Work in accordance with the Contract Documents.

Service Provider agrees and acknowledges that it has evaluated and is satisfied with the conditions and limitations under which the Work is to be performed, including, without limitation (i) the location, condition, layout and nature of the Project site and surrounding areas; (ii) generally prevailing weather and climatic conditions; (iii) anticipated labor supply and costs; (iv) availability and cost of materials, tools and equipment; and (v) other similar issues. Service Provider further represents and warrants that it is familiar with the entire Scope of its Work and that the Contract Price includes all of its Work that is specifically included in the Contract Documents or which is reasonably inferable from the Contract Documents.

1.4

In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, Service Provider shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement.

CONTRACT PRICE

As full compensation for performance of the Agreement, Dublin agrees to pay Service Provider in current funds the Contract Price for the satisfactory performance of the Work, in the manner described below, subject to all applicable provisions of the Agreement (check appropriate box):

X the firm fixed price of _____ Dollars ($_____) subject to additions and deductions as provided for in the Contract Documents; and/or

unit prices in accordance with the attached Schedule of Unit Prices and estimated quantities, which is incorporated herein by reference and identified as Schedule; and/or

time and material rates and prices in accordance with the attached Schedule of Labor and Material Costs which is incorporated herein by reference and identified as Schedule

2.2

The firm fixed-price, unit prices and/or time and material rates and prices are hereinafter referred to as the "Contract Price."

SURETY BONDING

BONDS

Service Provider shall, if required, furnish to Dublin appropriate surety bonds to secure performance of the Work and to satisfy all Service Provider's payment obligations under the Agreement. The surety bond shall provide that the terms of the Agreement and Contract Documents are incorporated by reference therein. Any bond provided by Service Provider pursuant to this provision is hereby deemed to so incorporate the Contract Documents and it is understood that the surety is accepting each and every responsibility and obligation which Service Provider has assumed toward Dublin under this Agreement and the Contract Documents, including but not limited to liability for indemnity, attorneys' fees and delay damages.

Bond: **X** Required Not Required

If a performance or payment bond, or both, are required of the Service Provider under this Agreement, then said bonds shall be in the full amount of the Contract Price, unless otherwise specified herein.

The cost of the bond, if required, is included in the Contract Price.

In the event Service Provider shall fail to provide the required bonds within seven days after date of signature of this Agreement by both Parties, Dublin after giving the Service Provider written notice and opportunity to cure this may terminate this Agreement and enter into a contract for the balance of the Work with another contractor. The Service Provider shall pay all Dublin's costs and expenses incurred by Dublin as a result of said termination.

PERFORMANCE OF WORK

TIME IS OF THE ESSENCE

It is expressly understood and agreed by and between the Parties that time is of the essence regarding completion of the Work by Service Provider. Service Provider shall undertake all activities necessary for the performance of its Work immediately upon receipt of a letter of intent or notification of the award of this Agreement and shall commence work hereunder so that the entire Project may be completed in accordance with the Project Schedule. Service Provider shall perform, coordinate and schedule its Work so as not to cause any delay or disruption to the Project Schedule, the work of other entities on this Project or the completion date of the Project.

Service Provider acknowledges and agrees that Dublin will incur additional costs, damages, liabilities, lost profits or losses related to loss of use if this Project is not completed in accordance with any milestone or interim dates/deadlines or the substantial or final completion dates on the Project Schedule. As a result, Service Provider shall be liable for and shall reimburse Dublin for any such additional costs, damages, liabilities, lost profits or losses related to loss of use for its failure to meet all milestone, interim, substantial or final completion dates in accordance with the Project Schedule.

RELATIONSHIP OF THE PARTIES

Service Provider accepts the relationship of trust and confidence established by this Agreement to exercise its skill and judgment to further Dublin's interests, and to perform the Work in an expeditious and economical manner consistent with Dublin's interests. Nothing in this Agreement shall be construed to constitute the relationship between Service Provider and Dublin as a partnership, association, or joint venture.

Service Provider shall perform its Work under the general direction of Dublin (and/or Dublin's representative, construction manager, architect, or other duly authorized individual/entity) and in accordance with this Agreement and as reasonably inferable from the Contract Documents as being necessary to produce the intended results as specified hereafter.

PROJECT SCHEDULE

Service Provider agrees to perform its work in accordance with the sequence and schedule for this Project, and with any updates thereto (referred to in this Agreement as the "Project Schedule"). By agreeing to perform its Work in accordance with the Project Schedule, Service Provider has included reasonable allowances for out of sequence work, and weather and unusual or unforeseen delays. If requested by Dublin, Service Provider shall participate and cooperate in the development of the Project Schedule and any revisions thereto.

Service Provider shall continuously monitor the Project Schedule so as to be fully familiar with the timing, phasing and sequence of operations of Service Provider's Work and the other work being performed on the Project. Service Provider shall coordinate its Work with all other work on the Project to avoid conflict or interference with such other work.

If Dublin determines that Service Provider's Work has failed to meet the Project Schedule or any update thereof, Service Provider shall within seventy-two (72) hours of its receipt of written notice from Dublin prepare and submit a recovery schedule relating to its activities. Service Provider agrees that it shall at its sole cost and expense take such measures as are necessary, including adding manpower and/or equipment and/or working overtime to accelerate its activities to conform to the Project Schedule or any update thereto. Should Service Provider fail to undertake such measures Dublin shall have the right to supplement Service Provider's forces and/or equipment and back-charge Service Provider for the costs so incurred, together with a markup of ten percent (10%) for overhead and profit.

PERFORMANCE

Service Provider shall use its best care, skill, and diligence in supervising, directing and

performing, the Work. Service Provider shall have sole responsibility for the performance of the Work, including the methods, techniques and means for completing all portions of the Work. Service Provider has the responsibility to ensure that all material suppliers and subcontractors adhere to the Contract Documents, and that they order materials in time, taking into account the current market regarding both pricing and delivery conditions.

EXTRAORDINARY MEASURES BY DUBLIN

If the performance of the Work, as of a milestone or interim date/deadline on the Project Schedule, has not progressed or reached the level of completion required by the Contract Documents, Dublin shall have the right to order Service Provider to take corrective measures necessary to expedite the progress of the Work, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. Dublin's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Project Schedule. Service Provider shall not be entitled to an adjustment in the Contract Price in connection with Extraordinary Measures required by Dublin.

INTERPRETATION OF AGREEMENT
INCONSISTENCIES AND OMISSIONS

Should inconsistencies or omissions appear in the Contract Documents, it shall be the duty of Service Provider to so notify Dublin in writing within three (3) working days of Service Provider's discovery thereof. Upon receipt of said notice, Dublin shall instruct the Service Provider as to the measures to be taken and Service Provider shall comply with Dublin's instructions. If Service Provider performs work knowing it to be contrary to any applicable laws, statues, ordinances, building codes, rules or regulations without notice to Dublin and advance approval by appropriate authorities, then Service Provider shall assume full responsibility for such work and shall bear all associated costs, charges, fees and expenses necessarily incurred to remedy the situation.

LAW AND EFFECT

The performance of this Agreement and all of its terms and conditions shall be interpreted and governed by the laws of the State of Ohio, unless otherwise noted herein.

SEVERABILITY

The partial or complete invalidity of anyone or more provisions of this Agreement shall not affect the validity or continuing force and effect of any other provision.

ENTIRE AGREEMENT

This Agreement is solely for the benefit of the signatories hereto and represents the entire and integrated agreement between the Parties hereto and, unless specifically referenced herein, supersedes any prior negotiations, representations, or agreements, either written or oral.

DUBLIN'S OBLIGATIONS

FINANCING INFORMATION

Upon written request from Service Provider, Dublin agrees to furnish reasonable evidence that financial arrangements have been made or otherwise exist to fulfill Dublin's payment obligations under the Agreement.

PROJECT FEES

Except for permits and fees, which are the responsibility of Service Provider, Dublin agrees to secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

TIMELY COMMUNICATIONS

Dublin, with reasonable promptness, shall transmit all submittals, transmittals, and written approvals relating to the Work. Any other information or services relevant to service Provider's performance of the Work under Dublin's control shall be furnished by Dublin after receipt from Service Provider of a written request for such information or services.

SERVICE PROVIDER'S OBLIGATIONS

RESPONSIBILITIES

Service Provider shall furnish all of the labor, materials, equipment, and services, including, but not limited to, competent supervision, shop drawings, samples, tools, and equipment as may be necessary for the proper performance of the Work in accordance with and as reasonably inferable from the Contract Documents.

SUBCONTRACTING

Service Provider shall provide to Dublin written notice that it intends to subcontract any of the Work covered by the scope of the Contract Documents to a third party. Dublin shall have the right to approve any and all such subcontracts and Service Provider shall not allow any work to be performed by any subcontractor that has not been approved in writing by Dublin. Service Provider agrees that it shall not be entitled to any additional compensation in the event that Dublin does not approve a proposed subcontractor. Service Provider further agrees to incorporate the terms and conditions of this Agreement into every subcontract.

In the event that Service Provider has work performed by a subcontractor who has not been approved by Dublin, Dublin shall have the right to terminate this Agreement or supplement Service Provider's Work as necessary to have the same completed in accordance with the Contract Documents. Any and all costs incurred by Dublin as a result of such action shall be the responsibility of Service Provider and Dublin may back-charge Service Provider therefor.

SHOP DRAWINGS SAMPLES, PRODUCT DATA AND MANUFACTURERS' LITERATURE

To the extent applicable or required, Service Provider shall promptly submit to Dublin for approval all shop drawings, samples, product data, manufacturers' literature and similar submittals as required by the Contract Documents or as required herein. Service Provider shall prepare and deliver its submittals to Dublin in such time and sequence so as not to delay the Project. The approval of any Service Provider submittal shall not be deemed to authorize deviations, substitutions or changes in the requirements of the Contract Documents unless express written approval is obtained from Dublin authorizing such deviation, substitution or change.

COORDINATION AND COOPERATION

Service Provider shall:

(a) cooperate with Dublin and all others whose work may interfere or interface with the Work;

(b) before proceeding with the Work under this Agreement, accurately check all previous and surrounding work done by other entities, determine its correctness, specifically note and immediately advise Dublin of any interference or discrepancies with the Work. Failure of Service Provider to detect and report discrepancies shall relieve Dublin of any and all Service Provider claims to recover cost, expense or damage resulting there from; and

(c) participate in the preparation of coordination drawings and work schedules involving the Work, to the extent required or requested by Dublin.

AUTHORIZED REPRESENTATIVE

Unless otherwise stated in writing by Dublin, Service Provider shall have a competent foreman, superintendent, or representative, satisfactory to Dublin, on the Project at all times with authority to act on behalf of Service Provider with respect to the work and for the purpose of receiving notices, orders and instructions. Service Provider shall identify the person or persons so authorized to act on its behalf, in writing, before commencing work on the Project. All decisions, agreements or representations made by Service Provider’s designated representative for this Project, whether oral or written, shall be binding on Service Provider.

TESTS AND INSPECTIONS

Service Provider shall schedule all required tests, approvals and inspections of the Work or portions thereof at appropriate times so as not to delay the progress of the Work or the Project. Service Provider shall bear all expenses associated with tests, inspections and approvals required of the Service Provider by the Contract Documents, unless otherwise agreed to.

WORKMANSHIP

Every part of the Work shall be executed in accordance with the Contract Documents in a workmanlike and professional manner. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work, and shall be new.

MATERIALS FURNISHED BY OTHERS

In the event the scope of the Work includes installation of materials or equipment furnished by others, it shall be the responsibility of Service Provider to examine those items, store and install the items, unless otherwise provided for in the Contract Documents, with such skill and care as to ensure a satisfactory and proper installation. Loss or damage due to acts of Service Provider shall be deducted from any amounts due or to become due Service Provider under this Agreement.

SUBSTITUTIONS

No substitutions shall be made in the Work unless permitted in the Contract Documents and then only upon the Service Provider first receiving all approvals required under the Contract Documents for substitutions.

WARRANTY

Service Provider warrants and guarantees that its Work conforms in all respects to the Contract Documents and that it is free from defects in material and/or workmanship. Service Provider hereby warrants and guarantees its work to be free of defects in material or workmanship for a period of one year from the date of substantial completion, or such longer period as may be required by the Contract Documents or provided by any manufacturer's warranty applicable thereto. Service Provider further agrees to furnish any special warranties required by the Contract Documents relating to its Work prior to and as a condition of final payment. Service Provider agrees to perform any remedial or corrective work necessary to satisfy its warranty obligations without cost to Dublin.

UNCOVERING/CORRECTION OF WORK

If directed in writing by Dublin, Service Provider must uncover any portion of the Work, which has been covered by the Service Provider in violation of the Contract Documents or contrary to a directive issued by Dublin. Upon receipt of a written directive from Dublin, Service Provider shall uncover such Work for Dublin's inspection and then

restore the uncovered Work to its original condition at the Service Provider's time and expense.

Dublin may direct Service Provider to uncover portions of the Work for inspection by Dublin at any time. Service Provider is required to uncover such Work whether or not Dublin had requested to inspect the Work prior to it being covered. This Agreement shall be adjusted by Change Order for the cost and time of uncovering and restoring any Work which is uncovered for inspection and proves to be installed in accordance with the Contract Documents, provided Dublin had not previously instructed the Service Provider to leave the Work uncovered. If Service Provider uncovers Work pursuant to a directive issued by Dublin, and such Work upon inspection does not comply with the Contract Documents, then Service Provider shall be responsible for all costs and time of uncovering, correcting and restoring the Work so as to make it conform to the Contract Documents.

Service Provider is required to correct in a timely fashion any Work rejected by Dublin for failing to comply with the Contract Documents whether observed prior to the commencement of the warranty period(s) or during the warranty period(s). Service Provider shall correct at its own cost and time and bear the expense of additional services for any nonconforming Work for which it is responsible.

CLEANUP

Service Provider shall at all times: (a) keep the Project and premises free from all rubbish and debris resulting from the Work; (b) broom clean each of its work areas prior to discontinuing work each day; and (c) clean up to the satisfaction of Dublin, including, but not limited to, dirt, grease, machine marks, etc., from walks, ceilings, floors, fixtures, etc. deposited or placed by or resulting from its Work.

If Service Provider fails to immediately commence compliance with cleanup duties within twenty-four (24) hours after written notification from Dublin of non-compliance, Dublin may implement appropriate cleanup measures without further notice and deduct the cost thereof from any amounts due or to become due to Service Provider under this Agreement.

SAFETY OF PERSONS AND PROPERTY

Service Provider is responsible for the health and safety of its employees, agents, subcontractors, and other persons on and adjacent to the Project site. Service Provider, however, shall take all necessary and prudent safety precautions with respect to its Work and shall comply with all safety programs and measures, and with all applicable laws, ordinances, rules, regulations and orders of any public authority for the safety of persons or property, including, but not limited to, OSHA. Service Provider shall also coordinate work activities with Dublin, other contractors or entities, or any other parties involved with this Project to reduce the risk of an accident or injury occurring.

Service Provider shall protect any of its Work and materials susceptible to damage from moisture or hosting of mold at all times. Service Provider agrees to indemnify, hold harmless and defend

Dublin from any and all claims, losses, costs and expenses (including, but not limited to, all attorneys' and consultants' fees) relating to or arising from mold resulting from Service Provider's Work.

INSURANCE

SERVICE PROVIDER'S INSURANCE

Prior to start of the Work, Service Provider shall procure and maintain in full force and effect Workers' Compensation Insurance, Employer's Liability Insurance, Comprehensive or Commercial General Liability Insurance on an occurrence basis, and any additional insurance required of Service Provider. Service Provider shall deliver all certificates of insurance to Dublin, or upon request, copies of the actual insurance policies. All liability insurance policies described above shall be written on a comprehensive form and shall conform to the laws of the State of Ohio. Before any of the Service Provider's employees perform any work on the Project, Service Provider shall furnish Dublin with the Insurance Company's certificate that such coverage has been provided and each certificate shall contain the required limits. Dublin shall be specifically named and included as an additional insured party under all coverage required by this Agreement and coverage for such additional insured shall also be amended to include a waiver of subrogation and primary and noncontributing endorsements in favor of the additional insured.

The types of insurance, and minimum amount of limits, required hereunder are:

(A) Workers' Compensation Insurance coverage: statutory requirements in the State of Ohio.

(B) Employers Liability Insurance with limits of not less than $1,000,000 to anyone person: USL&H; FELA; Jones Act; and, Continental Shelf Act Endorsements, if applicable.

(C) Commercial General Liability Insurance, written on an occurrence form:

X Standard Limits
Excess Liability Policy, if applicable: $____,000,000.
Professional Liability, if applicable, $1,000,000 Each Occurrence, with not less than a Five Year Completed Operations period if claims-made coverage.
Other policies.

NUMBER OF POLICIES

Commercial General Liability insurance and other liability insurance may be arranged under a single policy for the full limits required or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability Policy. The Umbrella Liability coverage must be as broad or broader than the Primary Insurance Policies.

PROPERTY INSURANCE

Service Provider is responsible to provide insurance coverage for tools, equipment or personal belongings that are owned or leased by the Service Provider or its employees at Service Provider's own expense. Service Provider accepts and shall bear the risk of loss for its property, material, or equipment, which is stored on-site and off-site.

SUBROGATION

Service Provider on behalf of itself, its insurers, successors and assigns does hereby waive any and all rights of subrogation against Dublin relating to or arising from any loss or damage which is within any insurance coverage of Service Provider, regardless of whether a claim has been submitted to or denied by the insurer.

INDEMNIFICATION AND DUTY TO DEFEND

Except to the extent expressly prohibited by statute, Service Provider agrees to fully indemnify and hold harmless Dublin and its elected officials, agents, officers, representatives, attorneys, employees, volunteers, indemnities, independent contractors and invitees from and against any and all claims, causes of action, amounts, damages, demands, expenses, judgments, liabilities, losses, obligations, proceedings and costs, including actual attorneys' fees, expert witness fees and costs incurred, that in whole or in part, arise out of, involve, result from, relate to or are alleged to have been caused by:

(a) The performance of any aspect of the Work by Service Provider or any of its subcontractors, independent contractors, suppliers, manufacturers, materialmen or persons or entities for whose acts Service Provider is or may be liable and/or their respective agents and/or employees;

(b) Act(s), failure(s) to act, omission(s) or negligence of or by Service Provider or any of its subcontractors, suppliers, manufacturers, materialmen or persons or entities for whose acts Service Provider is or may be liable and/or any of their respective agents and/or employees.

(c) Injury or death to persons or damage to property which arises out of, involves, results from, relates to or is caused by, in whole or in part, any action(s), inaction(s) and/or negligence of or by Service Provider or any of its subcontractors, independent contractors, suppliers, manufacturers, materialmen or persons or entities for whose acts Service Provider is or may be liable and/or any of their respective agents and/or employees.

(d) The failure of Service Provider to pay its subcontractors, suppliers, materialmen, laborers, union fringe benefits or any other obligation arising in the performance of the Work.

This indemnification provision shall not be construed to negate, abridge or reduce any other rights of Dublin and its elected officials, agents, officers, representatives, attorneys, employees, volunteers, indemnities, independent contractors and invitees.

In the event that any such claims, loss, cost, expense, liability, damage or other injury arise or are made or threatened against any indemnity hereunder, Dublin shall have the right to withhold any payments due or to become due to Service Provider an amount sufficient in its judgment and sole discretion to protect and indemnify in accordance with this provision against any and all such claims, loss, damage, cost and expense.

All indemnity obligations set forth in this Agreement shall survive the termination of this Agreement or the completion of Service Provider's Work.

CHANGES, CLAIMS AND DELAYS

CHANGES

Change to Agreement

Without invalidating this Agreement, Dublin may change, add to or reduce the Work to be performed hereunder. Any such change may be authorized as set forth herein.

Change Order

A Change Order is a document prepared by Dublin and signed by Service Provider stating their agreement upon the change in the scope of the Work, adjustment in the Contract Price and/or to the Project Schedule.

Adjustment in Contract Price

Service Provider shall not be entitled to receive compensation for extra work, materials or changes of any kind regardless of whether ordered by Dublin or Dublin's Representative, unless a written Change Order has been previously issued and signed by Dublin. If a change was ordered by Dublin or Dublin's Representative, and Service Provider performed but did not receive a written Change Order, Service Provider shall be deemed to have waived any claim for extra compensation, including anything related to schedule impacts or lost productivity, regardless of any written or verbal protests or claims by Service Provider. Dublin's issuance of a signed, written Change Order shall be deemed and construed as a condition precedent to Service Provider's filing of a valid claim for extra compensation as a result of Service Provider's performance of any work not originally included as part of the original scope of Work. If a Change Order requires an adjustment in the Contract Price, the adjustment shall be established by one of the following methods:

(a) mutual agreement on a lump sum, which shall be supported by sufficient information submitted by Service Provider to substantiate the amount, including specifically a labor, material, equipment and Service Provider's cost breakdown;

(b) unit prices already established in the Agreement or if not established by the Agreement then established by mutual agreement for the adjustment;

(c) on a time and material basis or, if none, then as otherwise allowed by the Contract Documents, or, if none, as jointly acceptable.

(d) for overtime work, Service Provider shall only be entitled to recover the premium time differential without mark-up of any kind.

Agreement on any Change Order shall constitute a final settlement, and full accord and satisfaction, of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, the cumulative effect on the Project of all change orders issued to the date thereof, all direct and indirect costs, home office overhead and any and all adjustments to the Contract Price or Project Schedule.

CLAIMS

Claim

A claim is a demand or assertion made in writing by Dublin or Service Provider seeking an adjustment to the Contract Price and/or Project Schedule, an adjustment or interpretation of the Agreement's terms, or other relief arising under or relating to this Agreement, including the resolution of any matters in dispute between Dublin and Service Provider in connection with the Project.

Timing of Claims

Claims by Service Provider must be made within 21 days after occurrence of the event giving rise to such Claim. Claims must be initiated by written notice to Dublin and must be submitted through the "Statement of Claim" Form attached As Exhibit A to this Agreement. Any submitted "Statement of Claim" Forms must be complete, accurate and contain all information requested by the "Statement of Claim" Form. Failure by Service Provider to present written claims within 21 days of the event giving rise to the claim through the "Statement of Claim" shall constitute an express waiver of any rights to additional time, money or other relief.

Claim Documentation

All Claims presented or submitted by Service Provider shall include all supporting documentation and information to allow Dublin to evaluate the Claim. Dublin may request any additional documentation or information from Service Provider (whether maintained in any form or medium) to assist in assessing and evaluating Service Provider's Claim, and Service Provider agrees to provide the same.

Within ten (10) days of its receipt of a written request, Service Provider shall make available to Dublin or Dublin's Representative any books, records or other documents or information in its possession, custody or control relating to any Claim. Service Provider shall also require its subcontractors and suppliers, regardless of tier, to do likewise.

DELAYS/TIME IMPACT

Should Service Provider delay the progress of the Work so as to cause Dublin to suffer or become liable for any damages, Service Provider agrees to pay to Dublin the full amount of any and all such damages. Such damages, at Dublin's option, may be deducted from any payments due, or which become due, under the Agreement. Nothing in this paragraph shall limit Dublin's right to claim all actual damages sustained by it as a result

of Service Provider's delay. In addition, Dublin may terminate this Agreement for default as provided in Article 13 herein.

Dublin shall have the right, at any time, to delay or suspend the start or prosecution of the whole or any part of the Work under this Agreement, or to vary the sequence of performance thereof. Progress schedules may from time to time be modified to conform to contract completion requirements.

Dublin shall not be liable to Service Provider for delay to Service Provider's Work by reason of fire or other casualty; or on account of riots or of strikes, or other combined action of the workmen or other persons; or on account of any acts of God; or any other cause, whether foreseen or unforeseen, beyond Dublin's control.

All schedules incorporated into the Contract Documents or provided during the course of the performance of the Work are provided for the Service Provider's convenience. Dublin does not warrant or guarantee such Schedule(s) and Service Provider should not rely upon the sequence or duration of activities as set forth therein for any purpose, including the pricing of the Work. Service Provider specifically acknowledges that the sequence and duration of activities set forth in the Schedule(s) typically change on projects of this size, nature and complexity, and that they are likely to change on this Project. Dublin shall have the right to determine and, if necessary, change the time, order and priority in which the various portions of the Work is to be performed and all other matters relative to the timely and orderly conduct of the Work.

PAYMENT

GENERAL PROVISIONS

Schedule of Values

If the Agreement is not a unit price agreement, then the Service Provider shall prepare and submit to the Contractor prior to the due date for the submission of Service Provider's first application for payment, a Schedule of Values apportioned to the various divisions or phases of the Work. The Schedule of Values shall include line items for each portion of the Work. Each line item contained in the Schedule of Values shall be assigned an appropriate monetary price such that the total of all such items shall equal the Contract Price. The Schedule of Values shall be prepared in such detail as may be required by Dublin.

Payment Use and Verification

Service Provider is required to pay for all labor, materials, and equipment used in the performance of the Work. Reasonable evidence, satisfactory to Dublin, may be required to show that all obligations relating to Subcontract Work are current before releasing any payment due to Service Provider. If required by Dublin, before final payment is made for the Work, Service Provider shall submit evidence satisfactory to Dublin that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Agreement and the Work, have been paid or otherwise satisfied.

Taxes

Service Provider agrees to withhold all municipal income taxes due or payable under the provisions of Chapter 181 of the Codified Ordinances of Dublin, Ohio, for wages, salaries and commissions paid to its employees and further agrees to require that all of its subcontractors shall also withhold any such municipal income taxes due under such chapter for any work completed or services performed related to this Project.

Payment Not Acceptance

Payment to Service Provider by Dublin does not constitute or imply acceptance of any portion of the Work.

PROGRESS PAYMENTS

Applications

Service Provider's Applications for Payment shall, unless otherwise required by Dublin or the Contract Documents, be submitted on the AlA 0702 form and shall be itemized and supported by the Service Provider's Schedule of Values, unit prices, and any other substantiating data as required by Dublin.

Partial Lien Waivers and Affidavits

Service Provider shall obtain from all of its subcontractors, vendors and suppliers, regardless of tier, a waiver of claim under the relevant mechanic's lien laws for the Project of all claim or lien rights for the amounts for which they have received payments with respect to the Project in the form attached hereto as Exhibit B to the Agreement.

Rejection of Service Provider's Payment Application

Dublin may reject a Service Provider's payment application or nullify a previously approved payment application, in whole or in part, as may reasonably be necessary to protect Dublin from loss or damage based upon:

(a) Service Provider's repeated failure to perform the Work as required by the Contract Documents;

(b) loss or damage arising out of or relating to the Contract Documents and caused by Service Provider to Dublin;

(c) Service Provider's failure to properly pay for labor, materials, equipment or supplies furnished in connection with the Work;

(d) rejected, nonconforming or defective Work, which has not been corrected in a timely fashion;

(e) reasonable evidence of delay in performance of the Work such that the Work will not be completed in accordance with the Project Schedule, and that the unpaid balance of the Contract Price is not sufficient to offset the additional costs or damages that may be incurred by Dublin as a result of the anticipated delay caused by Service Provider;

(f) reasonable evidence demonstrating that the unpaid balance of the Contract Price is insufficient to cover the cost to complete the Work; or

(g) third party claims involving Service Provider or reasonable evidence demonstrating that third party claims are likely to be filed unless and until Service Provider furnishes Dublin with adequate security in the form of a surety bond, letter of credit or other collateral or commitment which are sufficient to discharge such claims if established.

Payment Amount

Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

1. The portion of the Contract Price properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Price allocated to that portion of the Work in the schedule of values, less retainage of ten percent (10%). Pending final determination of cost to Dublin of changes in the Work, amounts not in dispute shall be included and paid upon approval and payment by Dublin.

2. The progress payment amount shall be further modified under the following circumstance: (a) Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Price, less such amounts as Dublin shall determine for incomplete Work, retainage applicable to such Work and unsettled claims.

3. Dublin shall not make advance payments to Service Provider for materials or equipment, which have not been delivered and stored at the site unless the Contract Documents allow otherwise.

Time of Application

For each progress payment period, Service Provider shall submit its progress payment application to Dublin for the Work performed to date no later than the fifth day of each month, unless otherwise agreed.

Stored Materials and Equipment

To the extent permitted by the Contract Documents, applications for payment may include materials and equipment not incorporated into the Work. Approval of payment applications for materials and equipment stored on or off the site shall be conditioned on submission by Service Provider of bills of sale and applicable insurance or such other procedures satisfactory to Dublin to establish the proper valuation of the stored materials and equipment.

Time of Payment

Dublin shall make progress payments for all undisputed amounts to Service Provider for satisfactory performance of the Work no later than thirty (30) calendar days after receipt of Service Provider's complete payment application.

FINAL PAYMENT

Application

Service Provider may submit its final payment application to Dublin upon acceptance of the Work by Dublin, and upon Service Provider furnishing evidence of fulfillment of the Service Provider's obligations in accordance with the Agreement.

Requirements

When submitting its final payment application, Service Provider shall furnish the following to Dublin:

(a) the Final Waiver of Lien form attached hereto as Exhibit C. Such form shall be in the amount of the application for final payment and be accompanied by the same Final Lien Waiver form executed by Service Provider's subcontractors, materialmen and suppliers;

(b) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which Dublin might in any way be liable, have been paid or otherwise satisfied;

(c) consent of Service Provider's surety to final payment, if applicable and required;

(d) satisfaction of closeout procedures required by Dublin;

(e) current certificates of insurance establishing that all insurance coverage required by the Agreement shall remain in effect through the final acceptance of the Project by Dublin, or such later date as may be required by the Contract Documents, and that such coverage will not be materially altered, expire or terminate without thirty (30) days prior certified mail notice thereof; and

(f) other data if required by Dublin, such as receipts, releases, and waivers of liens effective upon payment. Acceptance of final payment by Service Provider shall constitute a waiver of any and all claims (whether known or unknown) by Service Provider except those previously made in writing and identified by Service Provider as unsettled at the time of final application for payment.

Time of Payment

Final payment of the undisputed balance due of the Contract Price shall be made to Service Provider within ten (10) calendar days after receipt of all information required under Section 12.3 of this Agreement.

DISPUTE RESOLUTION

INITIAL DISPUTE RESOLUTION

If a dispute arises out of, or relates to this Subcontract or the alleged breach thereof, the parties shall endeavor to settle the dispute first through direct discussions by and between the parties respective Project Managers or principals.

If the dispute cannot be settled through direct discussions, the parties shall then endeavor to settle the dispute by mediation in accordance with the Construction Industry Mediation Rules of the American Arbitration Association. Notice of demand for mediation shall be filed in writing with the other party to this Agreement with the American Arbitration Association. The demand for mediation shall be made within a reasonable time after written notice of the claim, dispute or other matter in question has been given, but in no event shall it be made when institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statues of limitation. The location of the proceedings shall be in Dublin, Ohio, unless the parties agree otherwise. The parties shall share all costs of the mediation equally.

ARBITRATION/LITIGATION

In the event that a dispute is not resolved as set forth above, Dublin shall have the right, in its sole and exclusive discretion, to elect whether the dispute will then be decided by arbitration or litigation. In the event that Dublin should elect to resolve the dispute through Arbitration it shall so notify Service Provider in writing. The parties will then meet or confer to reach agreement on an arbitrator. The arbitration shall be conducted in general conformity with the Construction Industry Rules of the American Arbitration Association, however, the American Arbitration Association shall not administer the arbitration. The locale of any arbitration hearing shall be Dublin, Ohio. Any award rendered in the arbitration shall be final and binding upon the parties and may be enforced in any court of competent jurisdiction.

In the event that Contractor should elect to resolve the dispute through litigation jurisdiction thereof shall reside exclusively with the Common Pleas court of Franklin County, Ohio.

PREVAILING PARTY

In the event of any arbitration, the prevailing party shall be awarded its share of the arbitration costs and arbitrator compensation. For the purpose of the application of this provision, the arbitrator(s) shall determine the prevailing party as follows: the prevailing party shall be that party who's last written settlement position (demand/offer) made before the commencement of the arbitration hearing(s) is closest to the final award rendered by the arbitrator(s). In order to be considered for the purpose of this provision, any settlement position (demand/offer) must be in writing and must have been delivered by certified mail to the other party. It is the intent of this provision for the arbitrator(s) to identify the true party prevailing in any arbitration proceeding. To that end, in the event that a party seeking relief has not taken a settlement position, i.e. the claimant, the

arbitrator(s) shall consider the settlement demand to be the full relief requested in the arbitration demand. In the event that the respondent has not taken a settlement position,

the arbitrator(s) shall consider the offer to be a complete rejection of the relief requested by the claimant. Where there are mixed claims and counterclaims, the determination of the prevailing party shall be within the discretion of the arbitrator(s) consistent with the intent of this provision."

WORK CONTINUATION AND PAYMENT

Service Provider shall carry on the Work and maintain the Project Schedule pending final resolution of a Claim including mediation, arbitration or litigation, unless the Agreement has been terminated or the Work suspended as provided for in the Agreement, or the parties otherwise agree in writing to a partial or total suspension of the Work. If Service Provider is continuing to perform in accordance with the Agreement, Dublin shall continue to make undisputed payments as required by the Agreement.

RECOURSE BY DUBLIN
FAILURE OF PERFORMANCE

Notice to Cure

If Service Provider refuses or fails to supply enough properly skilled workers, proper materials, or maintain the Project Schedule, or it fails to make prompt payment to its workers, subcontractors or suppliers, disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a breach of a provision of this Agreement, Service Provider may be deemed in default of this Agreement. If Service Provider fails within three (3) working days after written notification to commence and continue satisfactory correction of such default, with diligence and promptness, then Dublin without prejudice to any other rights or remedies, shall have the right to any or all of the following remedies:

(a) supply such number of workers and quantity of materials, equipment and other facilities as Dublin deems necessary for the satisfactory correction of such default, which Service Provider has failed to complete or perform after the aforesaid notice, and charge the cost thereof to Service Provider, who shall be liable for the payment of same including reasonable overhead and profit;

(b) contract with one or more additional contractors, to perform such part of the Work, as Dublin shall determine will provide the most expeditious correction of the default and charge the cost thereof to Service Provider;

(c) without further notice to Service Provider, withhold payment of monies due the Service Provider in accordance with this Agreement; and

(d) in the event of an emergency affecting the safety of persons or property (as determined in Dublin’s sole discretion), Dublin may correct such default, without first giving three (3) working days' written notice to Service Provider, but shall

give prompt written notice of such action to Service Provider, and charge the cost thereof to the Service Provider.

Service Provider agrees to indemnify and hold Dublin harmless from and against any and all damage, loss, cost or expense, including the actual attorneys' fees incurred, arising from or relating to the default of Service Provider, regardless of whether Service Provider cures the default or is ultimately determined not to have been in default of its obligations under this Agreement, in which event the termination shall be deemed to have been a termination for Dublin's convenience.

Termination by Dublin

Termination for Default/Cause

If Service Provider fails to commence and satisfactorily continue correction of a default within three (3) working days after written notification from Dublin, then the Agreement may be terminated and Dublin may use any materials, implements, equipment, appliances or tools furnished by or belonging to Service Provider to complete the Work. Dublin shall issue a written notice of termination to Service Provider at the time the Agreement is terminated.

Dublin may also furnish those materials, equipment, and/or employ such workers or subcontractors, as Dublin deems necessary to maintain the orderly progress of the Work. Service Provider hereby consents to the assignment of its subcontracts or agreements which Dublin, in its sole discretion, deems necessary for the orderly progress of the Work, immediately upon the issuance of a determination of default.

All costs incurred by Dublin in performing the Work, shall be deducted from any monies due or to become due Service Provider under this Agreement. Service Provider shall be liable for the payment of any amount by which such expense may exceed the unpaid balance of the Contract Price.

Termination for Convenience

Dublin shall have the right to terminate this Agreement for its convenience by providing Service Provider with written notice thereof. Upon Service Provider's receipt of such notification it shall immediately cease work on the Project and take all steps reasonably available to minimize the cost of termination. In the event of such termination, Service Provider shall be entitled to receive as full and complete compensation the value of Work that is properly completed up to the date of termination as identified on the schedule of values, the cost of any stored material not previously paid for or incorporated in the Work which can not be returned or restocked, and reasonable direct costs of demobilization. Service Provider shall not be entitled to compensation for any field or home office overhead or any profit on work not performed.

In the event that any court or arbitration panel should determine that a termination of Service Provider by Contractor for cause was a breach of the Agreement, any such termination shall immediately be converted to a termination for convenience and Service Provider's damages shall be so calculated.

Use of Service Provider's Equipment

If Dublin performs work under this Article, or subcontracts such work to be so performed, Dublin and/or the persons to whom work has been subcontracted shall have the right to take and use any materials, implements, equipment, appliances or tools furnished by, belonging or delivered to Service Provider and located at the Project for the purpose of completing any remaining Work. Immediately upon completion of the Work, any remaining materials, implements, equipment, appliances or tools not consumed or incorporated in performance of the Work, and furnished by, belonging to, or delivered to the Project by or on behalf of Service Provider, shall be returned to Service Provider in substantially the same condition as when they were taken, normal wear and tear excepted.

BANKRUPTCY

Termination Absent Cure

Should there be filed by or against Service Provider a petition in bankruptcy, or for a reorganization, or should Service Provider become insolvent or be adjudicated as bankrupt or go into receivership, liquidation or dissolution, either voluntarily, involuntarily or under court order, or make a general assignment for the benefit of creditors, or otherwise acknowledge insolvency, then in any such event, each of which shall constitute a default hereunder on the Service Provider's part, Dublin shall have the right, in addition to any other rights and remedies provided by this Agreement, the Contract Documents or by law, to proceed in accordance with the provisions of Article 14 of this Agreement.

Interim Remedies

If Service Provider is not performing in accordance with the Project Schedule at the time a petition of bankruptcy is filed, or at any subsequent time, Dublin may avail itself of such remedies under this Article as are reasonably necessary to maintain the Project Schedule.

EQUAL OPPORTUNITY EMPLOYMENT

Service Provider shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin. Service Provider shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, age or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Service Provider agrees to post in conspicuous places, available to employees and applicants for employment, notices, which may be provided by Dublin setting forth the provisions of this equal opportunity pledge and commitment.

Service Provider shall comply with all provisions of the DPW Regulation on EEO, and the implementing rules, regulations and applicable orders of the State Equal Employment Opportunity Coordinator.

DUBLIN/OWNER:	**SERVICE PROVIDER:**
CITY OF DUBLIN, OHIO	_____
By: _____	By: _____
Its: _____	Its: _____
Date: _____	Date: _____

APPROVED AS TO FORM:

_____ Date: _____
Legal

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned (the "Principal") and _____ (the "Surety"), are hereby held and firmly bound unto the City of Dublin, Ohio ("Dublin") in an amount not to exceed one hundred percent (100%) of the agreed contract amount for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE ABOVE OBLIGATION is such, that whereas the Principal did on this _____ day of _____, **20** __, enter into a contract with Dublin which said contract is made a part of this bond the same as though set forth herein;

NOW, if the Principal shall well and faithfully do and perform the things agreed by the Principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, material men and laborers, for labor performed and materials furnished in the carrying forward, performing or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any material man or laborer having a just claim, as well as for Dublin; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety of 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 no modifications, omissions, or additions in or to the terms of the contract or to the work to be performed there under or in or to the plans or specifications therefore shall in any wise affect the Surety's obligations on this bond.

Signed this _____ day of _____, **20__**.

PRINCIPAL: _____

By: _____
(Signature)
Print Name: _____
Title: _____
Address: _____
_____
Telephone: ( ) _____

SURETY: _____

By: _____
(Signature)
Print Name: _____
Title: _____
Address: _____
_____
Telephone: ( ) _____

SURETY AGENT: _____

By: _____
(Signature)
Print Name: _____
Title: _____
Address: _____
_____
Telephone: ( ) _____

CERTIFICATION OF FUNDS

DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATION

I, Angel Mumma, Director of Finance of the City of Dublin, Ohio, certify that:

1. The Council of the City of Dublin, Ohio has appropriated $_____ for the above-referenced project by Resolution No. _____ adopted on _____, 20__.

2. The amount so appropriated is on deposit or in the process of collection to the credit of the appropriate fund free from any outstanding obligations.

CITY OF DUBLIN, OHIO

Date: _____

By:_____
Angel Mumma
Director of Finance

NOTICE TO PROCEED
Not Applicable ___
DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATION

To: _____

_____

_____

You are hereby notified to commence work within ten (10) business days from the date of receipt of this Notice to Proceed. You are required to complete the work within **sixty (60) consecutive calendar days.**

Return an acknowledged copy of this Notice to Proceed to:

Tim Elmer, Operations Administrator
City of Dublin
6555 Shier Rings Road
Dublin, Ohio 43016

CITY OF DUBLIN, OHIO

Date: _____

By: _____
Tim Elmer
Operations Administrator

RECEIPT OF NOTICE TO PROCEED

Receipt of this Notice to Proceed is hereby acknowledged this ____ day of _____, 2016.

Company Name: _____

Signature: _____

Print Name: _____

Title: _____

NOTICE OF COMMENCEMENT OF PUBLIC IMPROVEMENT

Not Applicable ___

Section 1311.252, Ohio Revised Code

Notice is hereby given of the commencement of a public improvement as follows:

1. The public improvement is identified as:

Project Name: **DUBLIN COMMUNITY RECREATION CENTER POOL RENOVATIONS**

Location: 5600 Post Road, Dublin, Ohio 43017

2. The public authority responsible for the public improvement is:

City of Dublin, Ohio
5200 Emerald Parkway
Dublin, Ohio 43017

3. The principal contractor and its surety on the public improvement are as follows:

Principal Contractor:_____	Surety:_____
Name_____	Name _____
Address _____	Address_____
City, State_____	City, State_____
Zip Code_____	Zip Code_____
Telephone Number _____	Telephone Number_____

4. The City of Dublin, Ohio first executed a contract with a principal contractor for the public improvement on _____ 2016.

5. The name and address of the representative of the City of Dublin, Ohio upon whom service may be made for the purposes of serving an affidavit pursuant to Section 1311.26 of the Ohio Revised Code is:

Tim Elmer, Operations Administrator
City of Dublin
6555 Shier Rings Road
Dublin, Ohio 43016

CITY OF DUBLIN, OHIO

By:_____
Tim Elmer,
Operations Administrator,
City of Dublin

Sworn to and subscribed before me this _____ day of _____, **2016**.

_____
Notary Public

CHANGE ORDER

DUBLIN COMMUNITY RECREATION CENTER
POOL RENOVATIONS

Change Order No. _____ Contractor Name: _____

Date: _____

Agreement Date: _____

The following changes are made to the contract documents:

_____
_____
_____
_____
_____

The changes are made for the following reasons:

_____
_____
_____
_____
_____

Change to contract price:

Original contract amount:	$ _____
Current contract amount adjusted by previous Change Orders:	$ _____
The contract will be (circle one: increased/decreased) due to this Change Order by:	$ _____
New contract amount (including this Change Order):	$ _____

Change to contract time:

The contract time will be (circle one: increased/decreased) due to this Change Order by _____ calendar days.

The date for completion of all work will be _____, **2016**.

This Change Order is signed this _____ day of ______, **2016**.

CONTRACTOR

_____

_____

Print Name: _____

Title: _____

CITY OF DUBLIN, OHIO

By: _____
Dana L. McDaniel
City Manager

By: _____
Tim Elmer,
Operations Administrator

By: _____
Angel Mumma
Director of Finance

SECTION 4
GENERAL PROVISIONS

CITY OF DUBLIN, OHIO
PUBLIC IMPROVEMENTS GENERAL PROVISIONS

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CITY OF DUBLIN, OHIO
GENERAL PROVISIONS

1010 - DEFINITIONS AND TERMS

Whenever in these general provisions or in other contract documents the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

101.01 Abbreviations. Whenever the following abbreviations are used in these general provisions or in any other contract documents, they are to be construed the same as the respective expressions represented:

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
AREA	American Railway Engineering Association
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWS	American Welding Society
AWWA	American Water Works Association
CMSC	Construction and Material Specifications - City of Columbus
EEI	Edison Electric Institute
FHWA	Federal Highway Administration, Department of Transportation
FSS	Federal Specifications and Standards, General Services Administration
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineering Association
ITE	Institute of Transportation Engineers
NEMA	National Electrical Manufacturers Association
ODOTCMS	Ohio Department of Transportation Construction and Material Specifications
OMUTCD	Ohio Manual of Uniform Traffic Control Devices
OSHA	Occupation Safety & Health Act
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories, Inc.

Unless otherwise stated in special provisions or in a drawing note, the latest revision of the above standards shall apply.

References made to date Specifications shall govern, unless the Engineer approves later revisions.

101.02 Advertisement. The public announcement, as required by law, inviting bids for work to be performed or materials and equipment to be furnished.

101.03 Award. The written acceptance by the City Manager of a bid.

101.04 Bidder. Any individual, firm, partnership, or corporation submitting a bid for the advertised work, acting directly or through a duly authorized representative.

101.05 Borrow Area. The term borrow area as used in this section refers to locations outside the right-of-way from which natural materials are removed for use in the work.

101.06 Bridge. A structure, including supports, erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads and having a length measured along the center of roadway of more than twenty feet between the center line of bearing of abutments or extreme limits of openings for multiple boxes.

101.07 Calendar Day or Day. Every day shown on the calendar.

101.08 Certified Test Data. A test report from an independent laboratory listing test data for the specified requirements for the samples tested and a statement furnished by the Contractor by a person having legal authority to act for the supplier and/or manufacturer of the material that the test report furnished represents the material delivered to the project. The certification shall include the laboratory report number and the number of the project to which the material is delivered. Laboratory reports signed by a registered professional engineer and those signed by other personnel and notarized will be accepted for this purpose.

101.09 Change Order. A written order issued by the Operations Administrator to the Contractor, covering changes in the plans or quantities or both, within or beyond the scope of the contract and establishing the basis of payment and time adjustments for the work affected by the changes.

101.10 City. The City of Dublin, Ohio, acting through its Operations Administrator or properly authorized agents thereof; such agents acting severally within the scope of the particular duties entrusted to them.

101.11 Completion. Completion of the project shall occur when all of the following items are completed in compliance with the contract: (1) the work has been satisfactorily completed in all respects; (2) the project is ready for use by the City; and (3) the Contractor has satisfactorily executed and delivered to the Operations Administrator all documents, certificates and proofs of compliance.

101.12 Completion Date. The date, as shown in the proposal, on which the work contemplated shall be completed unless extended by an approved written extension.

101.13 Conduit. Any pipe or similar passageway for electricity, gas, water or other utility.

101.14 Contract. The agreement between the City and the Contractor as set forth in the contract documents setting forth the obligations of the parties thereunder, including but not limited to, the performance of the work, the furnishing of labor and materials, and the basis of payment.

101.15 Contract Documents. The contract documents include the invitation to bid; proposals; affidavits; contract forms and contract bond; General Provisions at the time of the award of the contract; supplemental specifications; special provisions; general and detailed plans; notices to the Contractor; and any change orders and supplemental agreements that are required to complete the construction of the work in an acceptable manner, including authorized extensions of the completion date, all of which constitute one instrument.

101.16 Contract Bond. The approved form of security, executed by the Contractor and the Contractor's surety or sureties, guaranteeing complete performance of the contract and all supplemental agreements pertaining thereto and the payment of all legal debts pertaining to the construction of the project.

101.17 Contract Item (Pay Item). A specifically described unit of work for which a price is provided in the contract.

101.18 Contractor. The individual, firm, partnership, corporation, or other entity contracting with the City for performance of prescribed work, acting directly or through a duly authorized representative.

101.19 County. The county in which the work is to be performed.

101.20 Culvert. Any structure not classified as a bridge, which provides an opening under the roadway.

101.21 Department or Division. All references to "Department," or "Division," or any particular department or division of the City of Dublin, Ohio or any particular department or division of the State of Ohio shall refer to the Parks and Recreation, Parks & Open Space of the City of Dublin, Ohio.

101.22 Director. All references to Director shall refer to the Operations Administrator.

101.23 Operations Administrator. The Operations Administrator of the City of Dublin, Ohio or the Operations Administrator designated representative.

101.24 Equipment. All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work

101.25 Extra Work. An item of work not provided for in the contract as awarded but found essential to the satisfactory completion of the contract within its intended scope.

101.26 Extra Work Contract. A contract concerning the performance of work or furnishing of materials involving extra work. Such extra work may be performed at agreed prices or on a force account basis.

101.27 Fabricator. The individual, firm, or corporation that fabricates structural metals or prestressed concrete members as an agent of the Contractor.

101.28 Inspector. The Operations Administrator's authorized representative assigned to make detailed inspections of contract performance.

101.29 Invitation to Bid. The invitation for proposals for all work or materials on which bids are required. Such Invitation to Bid will indicate with reasonable accuracy the quantity and location of the work to be done or the character and quality of the material and/or equipment to be furnished and the time and place of the opening of proposals.

101.30 Laboratory. A reputable testing laboratory that is designated by or acceptable to the Operations Administrator for rendering testing and inspection services on a contract where these specifications govern.

101.31 Materials. Any materials specified for use in the construction of the project and its appurtenances.

101.32 National Holidays. New Years Day, January l; Martin Luther King's Birthday - the third Monday in January; Presidents' Day, the third Monday in February; Memorial Day, the last Monday in May; Independence Day, July 4; Labor Day, the first Monday in September; Thanksgiving Day, the fourth Thursday in November; Christmas Day, December 25.

101.33 Notice to Proceed. Written notice by the Operations Administrator to the Contractor, authorizing the beginning of work.

101.34 Owner. The City of Dublin, Ohio.

101.35 Plans. The plans, profiles, typical cross-sections, working drawings and supplemental drawings, approved by the Operations Administrator, or exact reproductions thereof, which show the location, character, dimensions and details of the work.

101.36 Profile Grade. The trace of a vertical plane along the centerline of roadway, or as indicated on the plans. Profile grade means either elevation or gradient of such trace according to the context.

101.37 Project. The specific section of the work together with all appurtenances and construction to be performed thereon under the contract.

101.38 Proposal. The offer of a bidder, on the prescribed form properly signed and guaranteed, to perform the work and to furnish the labor and materials at the prices quoted.

101.39 Proposal Form. The approved form on which the City requires bids to be prepared and submitted for the work.

101.40 Proposal Guaranty. The security furnished with a bid to guarantee that the bidder will enter into the contract if the bid is accepted.

101.41 right-of-way. A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to the project.

101.42 Road. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

101.43 Roadbed. The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder.

101.44 Roadside. A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway may also be considered roadside.

101.45 Roadside Development. Those items necessary to the complete highway which provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching and the placing of other ground covers; such suitable planting and other improvements as may increase the effectiveness and enhance the appearance of the highway.

101.46 Roadway. The portion of a highway or street within limits of construction.

101.47 Sewer. Pipe or conduit intended for carrying storm drainage or sanitary drainage.

101.48 Shoulder. The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

101.49 Sidewalk. The facility within the public right-of-way primarily constructed for the use of pedestrians.

101.50 Special Provisions. Additions and revisions to the standard and supplemental specifications covering conditions peculiar to an individual project.

101.51 Specifications. The directions, provisions and requirements contained in General Provisions; all as supplemented by the supplemental specifications and special provisions.

101.52 State. The State of Ohio acting through its authorized representative.

101.53 Street. A general term denoting a public way for purposes of vehicular travel, including all improvements within the right-of-way such as sidewalks, bikepaths, sewers, and streetlights.

101.54 Structures. Bridges, culverts, catch basins, curb inlets, drop inlets, retaining walls, cribbing, manholes, end walls, buildings, curbs, pavements, sewers, water mains, service pipes, under drains, foundation drains and other features which may be encountered in the work and not otherwise classed herein.

101.55 Subcontractor. An individual, firm, partnership, corporation or other entity to whom the Contractor sublets part of the contract with the written approval of the Operations Administrator.

101.56 Subgrade. The surface upon which a structure or work and appurtenances are to be constructed.

101.57 Substructure. All of that part of a bridge or culvert below the bearings of simple and continuous spans, skewbacks of arches and tops of footings of rigid frames, together with back walls and wings.

101.58 Superintendent. The Contractor's authorized representative in responsible charge of the work.

101.59 Superstructure. The entire structure except the substructure.

101.60 Supplemental Specifications. Detailed specifications supplemental to or superseding these General Provisions or any other provisions.

101.61 Surety. The corporation, partnership or individual, other than the Contractor, executing a bond furnished by the Contractor.

101.62 Titles (or Headings). The titles or headings of the sections and subsections herein are intended for convenience of reference and shall not be considered as having any bearing on their interpretation.

101.63 Water line. Conduit for carrying public water supply.

101.64 Work. The furnishing of all labor, services, materials, equipment, and other incidentals necessary or convenient to the successful completion of the project and the carrying out of all duties and obligations imposed by the contract.

101.65 Work Days. Wherever indicated in these specifications, work days are defined as: Monday, Tuesday, Wednesday Thursday, Friday, and Saturday, excluding national holidays.

101.66 Working Drawings. Stress sheets, shop drawings, erection plans, false work plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplementary plans or similar data which the Contractor is required to submit for approval.

101.67 Interpretations. In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be, done, if, as, or when, or where contemplated, required, determined, directed, specified authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned, it shall be understood as if the expression were followed "by the Director of Public Works" or "to the Director of Public Works".

1020 - BIDDING REQUIREMENTS AND CONDITIONS

102. 01 **Pre-qualification of Bidders**
102. 02 **Availability of Contract Documents**
102. 03 **Proposals**
102. 04 **Interpretation of Quantities in Proposal**
102. 05 **Examination of Plans, Specifications, Special Provisions, and Site of Work**
102. 06 **Preparation of Proposal**
102. 07 **Irregular Proposals**
102. 08 **Proposal Guaranty**
102. 09 **Delivery of Proposals**
102. 10 **Withdrawal of Proposals**
102. 11 **Public Opening of Proposals**
102. 12 **Statement of Materials**
102. 13 **Combination or Conditional Proposals**

102.01 Pre-qualification of Bidders. Not applicable to this contract.

102.02 Availability of Contract Documents. The contract documents are available to prospective bidders at the locations stated in the Invitation to Bid. The prospective bidder will be required to pay the Architect the sum stated in the Invitation to Bid for each set of the contract documents.

102.03 Proposals. The City reserves the right to disqualify or refuse to consider a proposal if a bidder is in default for any of the following reasons:

(a) More than one proposal for the same work from an individual, partnership, joint venture, corporation or other entity under the same or different name, or corporation under the same name or corporations with one or more of the same persons as officers of such corporations, or corporations who are holding companies, parent companies or holding companies which are subsidiaries of such corporations.

(b) Evidence of collusion among bidders. Participants in such collusion will receive no recognition as bidders for any future work of the City for a period of three years.

(c) Bid prices which obviously are unbalanced.

(d) Lack of competency and/or adequate machinery, plant and other equipment.

(e) Uncompleted work, whether or not with the City, which, in the judgment of the City, might hinder or prevent the prompt completion of additional work if awarded.

(f) Failure to comply with the Pre-qualification requirement of 102. 01.

(g) Failure to perform previous contracts adequately or a breach of prior contracts, whether or not the breach was waived by the City at a prior time.

(h) Any other reasonable cause.

102.04 Interpretation of Quantities in Proposal. Not applicable to this contract.

102.05 Examination of Plans, Specifications, Special Provisions, and Site of Work. The bidder is expected to examine carefully the site of the proposed work and the contract documents before submitting a proposal. The bidder may also make additional investigations of subsurface conditions prior to submitting the bid. Such soil tests and investigations shall be at the bidder's expense and at no cost to the City. Any physical variation at the site of the work from that indicated by the contract documents, noted by the Contractor during the required examination or during any additional investigation conducted by the bidder, shall be called to the attention of the Operations Administrator prior to submitting a proposal. The submission of a proposal shall be considered evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the contract documents.

No pleas of ignorance of any provisions of the contract documents or of available subsurface data which may have been obtained by the City or its authorized representatives for use in designing the project shall not be accepted as a basis for any claim for extra compensation, extra work or for any extension of time.

Data concerning subsurface materials or conditions may have been obtained by the City for use in designing the project. Said borings, test excavations, and other subsurface investigations even if incorporated into the plans, if any, are incomplete, are not a part of the contract documents, and are not warranted to show the actual subsurface conditions. Said subsurface data, if not in the plans, is available for review by bidders upon written request and execution of a release for subsurface information. Bidders shall not rely on subsurface information obtained from the City and the City will not be responsible in any way for additional compensation for excavation work performed under the contract due to the Contractor's assumptions or deductions based on said subsurface data. The Contractor agrees that no claims will be made against the City, if, in carrying out the work, it is found that the actual subsurface conditions encountered do not conform to those indicated by said borings, test excavations and other subsurface investigations.

All soil data obtained from the City is for information only and indicates conditions existing at the time of the tests. The information is not guaranteed to be indicative of any subsurface condition except at the particular and exact locations of the borings.

102.06 Preparation of Proposal. The bidder shall submit the proposal upon the forms furnished by the City. All the words and figures shall be in ink or typed.

When an item in the proposal contains a choice to be designated by the bidder, the bidder shall indicate that choice in accordance with the specifications for that particular item, and thereafter no further choice will be permitted.

The bidder's proposal must be signed with ink by the individual, by one or more members of the partnership, by one or more members or officers of each firm representing a joint venture, or by one or more officers of a corporation, or by an agent of the Contractor legally qualified and acceptable to the City. If the proposal is made by an individual, the name and business address of that individual must be shown; if as a partnership, the names and business addresses of all general partners must be shown; if as a joint venture, the name and business address of each member of the joint venture must be shown; if by a corporation, the name of the state under the laws of which the corporation is chartered, the name of the corporation and the names and business addresses of its corporate officers must be shown; or if by any other business entity, the names and addresses of the principals of such entity. Anyone signing a proposal on behalf of a corporation must file with the proposal legal evidence of one's authority to do so.
Before a contract will be awarded to a foreign corporation or a person or partnership non-resident of the State of Ohio, such foreign corporation, person, or partnership non-resident shall file with the Secretary of State of Ohio a power of attorney designating his or its agent or the Secretary of State of Ohio, as agent, for the purpose of accepting service of summons, in any action in law or equity, or both, brought in the State of Ohio.

102.07 Irregular Proposals. Proposals will be considered irregular and may be rejected for reasons including but not limited to the following:

(a) If the proposal is on a form other than that furnished by the City, or if the form is altered or any part thereof is detached.

(b) If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.

8 If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award. This does not exclude a bid limiting the maximum gross amount of awards acceptable to any one bidder at any one bid letting, provided that any selection of awards will be made by the City.

(d) If the proposal is not signed by the bidder.

(e) If the proposal is not typed or written legibly in ink.

102.08 Proposal Guaranty. No proposal will be considered unless accompanied by a certified check, cashier's check, letter of credit, or a satisfactory bid bond, in an amount not less than ten percent of the bidder's proposal, including the base bid and all alternates conditioned upon execution of the contract and the furnishing of a performance bond in the event the contract is awarded to the bidder.

102.09 Delivery of Proposal. The proposal shall be placed, together with the proposal guaranty, in a sealed envelope so marked as to indicate the identity of the project and the name and address of the bidder. If forwarded by mail, said envelope shall then be placed in another envelope which shall be sealed and addressed as indicated in the proposal. Proposals will be received until the hour and date set for the opening thereof and must be in the hands of the official indicated by such time. Proposals received after the time for opening of bids will be returned to the bidder unopened.

102.10 Withdrawal of Proposals. No bidder may withdraw his proposal unless a written request to do so is submitted to the Operations Administrator prior to the time set for opening of the proposals. When such request is received, the proposal will be returned to the bidder unopened.

102.11 Public Opening of Proposals. Proposals will be opened and read publicly at the time and place designated by the Operations Administrator. Bidders, their authorized agents and other interested parties are invited to be present.

102.12 Statement of Materials. Before any contract is awarded, the bidder may be required to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the work together with samples, which samples may be subjected to the tests provided for in the specifications to determine their quality and fitness for the work.

102.13 Combination or Conditional Proposals. If the City so elects, proposals may be issued for the project in combination, unless otherwise stated on the proposal form. The City reserves the right to make awards on combination bids or separate bids to the best advantage of the City. No combination bids, other than those specifically stated on the proposal form by the City, will be considered. Separate contracts will be written for each individual project included in the combination.

103. - AWARD AND EXECUTION OF CONTRACT

103. 01 Consideration of Proposals
103. 02 Award of Contract
103. 03 Cancellation of Award
103. 04 Return of Proposal Guaranty
103. 05 Requirement of Contract Bond
103. 06 Execution of Contract
103. 07 Failure to Execute contract
103. 08 Contractor's Insurance

103. 09 Fire and Builder's Risk Insurance
103. 10 Railroad Protective Insurance
103. 11 Workers' Compensation Insurance

103.01 Consideration of Proposals. After the proposals are opened and read, they will be compared on the basis of the summation of the products of the approximate quantities shown in the proposal by the unit bid prices. In the event of a discrepancy between unit bid prices and extensions, the unit price shall govern.

The right is reserved to reject any or all proposals, to waive technicalities or to advertise for new proposals, if in the judgment of the awarding authority the best interests of the City will be promoted thereby.

The City reserves the right to hold proposals for a period of up to sixty days after the opening, and to award a contract at any time during that period.

103.02 Award of Contract. The award of the contract, if it be awarded, will be made as soon as is reasonably possible after the opening of the proposals to the lowest and best bidder whose proposal complies with all the requirements prescribed. In no case will an award be made until all necessary investigations are made as to the responsibility of the bidder to whom it intends to award the contract. The successful bidder will receive a Notice of Intent to Award sent to the bidder at the address shown in the proposal stating that its proposal has been accepted by the City.

103.03 Cancellation of Award. The City reserves the right to rescind the award of any contract at any time before the execution of said contract by all parties without any liability against the City.

103.04 Return of Proposal Guaranty. All proposal guaranties, except those of the three lowest bidders, will be returned immediately following the opening and checking of the proposals. The retained proposal guaranties of the three lowest bidders will be returned within ten days following the award of contract and that of the successful bidder will be returned after a satisfactory performance bond has been furnished and the Agreement for Construction has been executed.

103.05 Requirement of Performance Bond. The successful bidder must within ten days after receiving the Notice of Intent to Award and before execution of the Agreement for Construction by the City, furnish a performance bond in the form provided by Ohio Revised Code Section 153. 57 in the full amount of the proposal. Said bond shall cover the entire contract including the guarantee period required under 109. 11. The successful bidder's failure to submit a performance bond with the executed Agreement for Construction shall be deemed a refusal by the bidder to enter into a contract and shall release the City from all obligations to the bidder.

103.06 Execution of Contract. The Agreement for Construction shall be signed by the successful bidder and returned, together with the performance bond and other required contract documents, within ten days after the bidder has received the Notice of Intent to Award.

103.07 Failure to Execute Contract. Failure of the bidder to execute the Agreement for Construction and file an acceptable performance bond shall be just cause for the cancellation of the award and the forfeiture of the proposal guaranty which shall become the property of the City, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest and best bidder, or the work may be re-advertised as the Operations Administrator may decide.

103.08 Contractor's Insurance.

(A) General. The Contractor shall secure and maintain, at his/her own expense, until completion of the contract, general liability and property insurance as shall protect him and the City from claims for personal injury or property damage which may arise because of the nature of the work or from operations under this contract.

(B) General Liability. The Contractor shall have General Liability coverage on a per project basis, per occurrence, and in comprehensive form. General Liability coverage shall include Products/Completed Operations, Explosion Underground and Collapse Hazard, Premises Operations, Contractual, Independent Contractors, Broad Form Property Damage and Personal Injury.

The Contractor shall provide General Liability and Excess General Liability coverage in the following amounts, at a minimum:

Projects less than $1,000,000: Contractor shall have total limits of insurance to include primary and excess coverage in an amount not less than $2,000,000. (Examples: may be $1,000,000 primary and $1,000,000 excess, $2,000,000 primary, or other equivalent combination.)

Projects greater than $1,000,000: Contractor shall provide total limits of insurance to include primary and excess coverage in an amount of not less than $5,000,000. (Examples: may be $1,000,000 primary and $4,000,000 excess, $2,000,000 primary and $3,000,000 excess, or other equivalent combination.)

(C) Automobile Liability. The Contractor shall secure, and maintain, at his/her own expense, until the completion of the Contract, coverage for any auto, including non-owned and hired autos, with a combined single limit of $1,000,000 per occurrence. The City shall be named as an Additional Insured.

(D) Workers' Compensation Insurance. Before beginning work, the Contractor shall furnish to the City satisfactory proof that he/she has, for the period covered under the Contract, full Workers' Compensation coverage for all persons whom he/she may employ directly, or through subcontractors, in carrying out the work contemplated under the Contract, and shall hold the City free and harmless for all personal injuries of all persons whom the Contractor may employ directly or through subcontractors.

(E) Additional Insured. The Contractor shall name the City of Dublin, Ohio as an "Additional Insured" on all insurance policies, except Workers' Compensation, and this shall be reflected on the Certificate of Insurance.

(F) Cancellation Notice or Material Change of Coverage. The Contractor's required insurance shall be endorsed to provide that the policy(ies) will not be canceled, reduced, discontinued, or otherwise materially altered during the period of performance without thirty (30) days prior written notice to the Operations Administrator.

(G) Certificate(s) of Insurance. Prior to commencing work under each contract or subcontract, certificates of insurance shall be submitted and approved by the City. The Contractor is responsible for obtaining certificates of insurance establishing that the Contractor and all subcontractors have complied with insurance requirements previously stated.

(H) Rating of Insurance Company(ies). Any and all insurance company(ies) supplying coverage to the Contractor must have no less than an A- rating in accordance with the A. M. Best rating guide.

104. - SCOPE OF WORK

104. 01 Intent of Contract
104. 02 Alteration of Plans or Character of the Work
104. 03 Extra Work
104. 04 Modification of Contract
104. 05 Maintenance of Traffic and Accessibility to Utilities
104. 06 Materials Found on the Work Site
104. 07 Final Cleaning Up

104.01 Intent of Contract. The intent of the contract is to provide for the construction and completion in every detail of the work described. The Contractor shall perform all items of work covered and stipulated in the proposal and perform altered and extra work, furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the plans, specifications and terms of the contract. Should any misunderstanding arise as to the intent or meaning of the plans, specifications, special provisions or proposal, or any discrepancy appear, the decision of the Operations Administrator shall be final and conclusive.

104.02 Alteration of Plans or Character of the Work. The City reserves the right to make, at any time during the progress of the work, such increases or decreases in quantities and such alterations in the details of construction, including alterations or alignments of road structures, grades, etc..., as may be found to be necessary or desirable. Such increases or decreases and alterations shall not invalidate the contract nor release the surety, and the Contractor agrees to perform the altered work the same as if it had been a part of the original contract. The Contractor shall insure that coverage provided by the surety is maintained at the same value as the altered project value.

Unless such alterations and increases or decreases materially change the character of the work to be performed or the cost thereof, the altered work shall be paid for at the same unit prices as other parts of the work. In this case, all expenses for increased alterations and increased costs shall be borne solely by the Contractor. If, however, the character of the work or the unit costs thereof are materially changed, an allowance shall be made on such basis as may have been agreed to in advance of the performance of the work, or in case no such basis has been previously agreed upon, then an allowance shall be made, either for or against the Contractor, in such amount as the Operations Administrator may determine to be fair and equitable.

Should the Contractor encounter or the Operations Administrator discover during the progress of the work or any conditions at the site differing materially from those indicated in this contract, or unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract the Operations Administrator shall be promptly notified in writing of such conditions before they are disturbed. The Operations Administrator will thereupon promptly cause the investigation of conditions and if they are found to so materially differ and cause an increase or decrease in the cost of, or the time required for performance of the contract, an equitable adjustment will be made.

Latent physical subsurface conditions such as abandoned public and private utilities, ancient foundations or other such man-made structures of which the City and the Contractor could not have been aware, or reasonably could not have been aware of at the time of the execution of the contract, may qualify for adjustment in time of completion and increased cost of construction, all of which must be documented by the Contractor and submitted to the Operations Administrator for approval.

Any adjustment in compensation because of a change or changes resulting from one or more of the conditions described in the foregoing paragraphs will be made in accordance with the provisions of 104. 03 and 104. 04. Any adjustment in contract time because of changes will be made in accordance with the provisions of 108. 06.

104.03 Extra Work. Subject to 104. 04, the Contractor shall perform unforeseen work, for which there is no price included in the contract, whenever it is deemed necessary or desirable in order to complete fully the work as contemplated. Such work shall be performed in accordance with the specifications and as directed, and will be paid for as provided under 109. 04.

104.04 Modification of Contract. When it becomes necessary in the opinion of the Operations Administrator, in the prosecution of any work or improvement under contract, that alterations or extra work are needed, the same shall only be made upon a written change order approved by the City Manager. No such change order shall be effective until the price to be paid for the work or material, or both, under the altered or modified contract shall have been agreed upon in writing and signed by the Contractor and the City Manager on behalf of the City.

The Contractor shall have no claim for and nor be entitled to compensation for any such alterations or extra work until the same have been incorporated into appropriate change orders.

All such change orders must be approved by the City Manager and have an appropriate Certification of Funds by the Finance Director of Dublin attached to the change order.

104.05 Maintenance of Traffic and Accessibility to Utilities. The Contractor shall at all times provide and maintain access to fire hydrants, water valves, water service boxes, gas valves, gas, service boxes, manholes and other similar appurtenances.

When so stated on the plans or in the proposal, public traffic shall be maintained during construction. This may be traffic through the project or it may be only cross traffic at intersections. Maintenance of traffic may be required only at certain stages of construction or at all times, if so noted.

At locations on the work where sewer or water line construction only is called for and a part of the existing pavement will remain in place, traffic will be maintained and ingress and egress to all public and private entrances shall be provided.

In the event of the complete closure of any street, alley or private drive, the Contractor shall notify the occupants of all premises affected by such closure as per 614. 04 of the CMSC.

Whenever the Contractor, for any reason, ceases operations on this contract for a period of fifteen or more calendar days, the Contractor, if so directed by the Operations Administrator, shall construct a temporary roadway to provide access to the premises affected by project operations. The temporary roadway shall be constructed of cinders, gravel, crushed stone or other acceptable materials and of suitable width and thickness to carry anticipated vehicles, as directed by the Operations Administrator. The temporary roadway shall be maintained by the Contractor in serviceable condition until such time that the contract work is resumed. The cost of constructing and maintaining the temporary roadway shall be borne by the Contractor.

Failure of the Contractor to perform the operations stated in this section when directed by the Operations Administrator, within a reasonable time as determined by the Operations Administrator, will give the City authority to perform the work and bill the cost of same to the Contractor.

All traffic control devices shall be furnished, erected, maintained and removed by the Contractor in accordance with the OMUTCD and paid for in accordance with the provisions of 614 of the CMSC. When the proposal does not include the cost of maintaining traffic, this work shall be performed but will not be paid for directly, and the cost of this work shall be included in the price bid for various items in the proposal. The provisions of these items and this section shall not in any way relieve the Contractor of any of his legal responsibilities or liabilities for the safety of the public. The attention of the bidder is directed to the provisions of 107. 02 (Permits, Licenses, and Taxes) and 107. 08 (Public Convenience and Safety).

104.06 Materials Found on the Work Site. The Contractor may use stone, gravel, sand or other material found on the work site subject to approval by the Operations Administrator. The Contractor shall be paid for the excavation of such stone, gravel, sand or other material at the unit prices set forth in the proposal for such items; provided however that the cost of any

additional inspections directed by the Operations Administrator for such materials shall be deducted from the payments to the Contractor for such materials. The Contractor, at its expense, shall replace the material removed with material approved by the Operations Administrator. The Contractor shall not excavate or remove any material from within the project location which is not within the grading limits, as indicated by the slope and grade lines, without written authorization from the Operations Administrator.

Unless otherwise provided, the material from any existing old structure may be used temporarily by the Contractor in the erection of the new structure. Such material shall not be cut or otherwise damaged except with the approval of the Operations Administrator.

104.07 Final Cleaning Up. Before final acceptance, all ground occupied by the Contractor in connection with the work shall be cleaned of all rubbish, excess materials, temporary structures, and equipment. These areas shall have suitable vegetative cover established by seeding and mulching or sodding as required by 659 or 660 of the CMSC, the cost of which to be included in various items bid, unless a separate bid item is provided in the proposal, and all parts of the work shall be left in an acceptable condition.

105. - CONTROL OF WORK

105. 01 Authority of the Operations Administrator
105. 02 Plans and Working Drawings
105. 03 Conformity with Plans and Specifications
105. 04 Coordination of Plans, Specifications, Supplemental Specifications and Special Provisions
105. 05 Cooperation by Contractor
105. 06 Night Work and Sundays
105. 07 Work on National Holidays
105. 08 Cooperation with Utilities
105. 09 Cooperation Between Contractors
105. 10 Construction Stakes, Lines and Grades
105. 11 Photographs and Videos
105. 12 Authority and Duties of the Inspector
105. 13 Inspection of Work
105. 14 Unauthorized Work
105. 15 Load Restrictions
105. 16 Maintenance During Construction
105. 17 Failure to Maintain Roadway or Structures, Traffic Control Facilities and Other Appurtenances
105. 18 Borrow and Waste Areas
105. 19 Use of Fire Hydrants
105. 20 Claims
105. 21 Moving of Equipment

105.01 Authority of the Operations Administrator. The Operations Administrator will decide all questions which may arise as to the quality and acceptability of materials furnished,

work performed and rate of progress; all questions which may arise as to conformity with plans, specifications and other contract documents; all questions as to the acceptable fulfillment of the contract on the part of the Contractor; and all questions which may arise as to interpretation of the plans, specifications, and other contract documents.

The Operations Administrator has immediate charge of the engineering details of each construction project and is responsible to insure that the Contractor satisfactorily administers and completes the project. The Operations Administrator has the authority to reject defective material and to suspend any work that is being improperly performed.

The Operations Administrator will have the authority to suspend the work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the workers or the general public; for failure to carry out provisions of the contract; for failure to carry out orders; and for such periods as may be deemed necessary due to unsuitable weather. The suspension of the work for the above reasons does not relieve the Contractor of responsibility according to 107. 14.

In the event the Operations Administrator orders the work suspended for unsafe conditions (whether they be unsafe to workers or the public), unsuitable weather, use of defective material not in conformity with the specifications or because work is being improperly performed, the expense, whether direct or indirect, for such suspension shall be borne solely by the Contractor.

105.02 Plans and Working Drawings. The plans will show location and design details of all structures, lines, grades, and typical cross sections of roadways, conduits and all other items required by the contract. The Contractor shall keep one set of the plans available at the project site at all times.

The Contractor shall be responsible for the furnishing of copies of plans, specifications and special provisions, or the necessary portions thereof, to subcontractors and parties furnishing labor, materials and equipment for the project.

The plans will be supplemented by such working drawings as are necessary to adequately control the work. Working drawings for structures shall be furnished by the Contractor and shall consist of such detailed plans as may be required to adequately control the work and are not included in the plans furnished by the City. All working drawings must be approved by the Operations Administrator and such approval shall not operate to relieve the Contractor of any responsibility under the contract for the successful completion of the work. Where work consists of repairs, extensions or alterations of existing structures, the Contractor shall make such measurements of original construction as may be required to accurately join old and new work. Any measurements which may appear upon the plans to indicate the extent and nature of such repair or extension shall not relieve the Contractor of this responsibility.
The contract price will include the cost of furnishing all working drawings.

105.03 Conformity with Plans and Specifications. All work performed and all materials furnished shall be in conformity with the lines, grades, cross sections, dimensions and material requirements, including tolerances, shown on the plans or indicated in the specifications.

In the event that the Operations Administrator finds the materials, or the finished product in which the materials are used, not in conformity with the plans and specifications, but that acceptable work has been produced, the Operations Administrator shall then make a determination if the work shall be accepted and remain in place. In this event, the Operations Administrator will document the basis of acceptance by change order which will provide for an appropriate adjustment in the contract price for such work or materials as the Operations Administrator deems necessary.

In the event the Operations Administrator finds the materials of the finished product in which the materials are used or the work performed are not in conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed, replaced or otherwise re-mediated by, and at the expense of, the Contractor.

Failure of the Contractor to follow the order of the Operations Administrator pursuant to this section shall give the City the unqualified right to remove, replace, or otherwise remediate the defective work or materials any and all expense incurred by the City, directly or indirectly, shall be deducted or billed to the Contractor at the option of the Operations Administrator.

105.04 Coordination of Plans, Specifications, Supplemental Specifications and Special Provisions. The specifications, the supplemental specifications, the plans, special provisions, proposal, and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions, plan notes will govern over specifications, supplemental specifications will govern over specifications; proposals and special provisions will govern over both specifications and plans.

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, it shall immediately be made known to the Operations Administrator. The Operations Administrator will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

105.05 Cooperation by Contractor. The Contractor must obtain one copy of the specifications and two sets of the plans at the Contractor's own cost and keep available at least one set of the specifications, the plans and all other contract documents including special provisions at the project site at all times.

Unless otherwise provided for in the plans or proposal, no work shall be commenced under this contract until a pre-construction conference has been held. In general, fourteen days are required to notify all interested parties of a pre-construction conference. Upon confirmation of a valid contract, the Operations Administrator will fax or mail, via U.S. postal service-first class, pre-construction conference notices to all parties. The Contractor shall take due note of this requirement and aid in the timely scheduling of the pre-construction conference to avoid unnecessary delays in the commencement of the work. Following the pre-construction conference, the Operations Administrator will issue a Notice to Proceed to the Contractor. The

Contractor is required to commence work within ten days from the date of receipt of the Notice to Proceed.

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Operations Administrator, inspectors and other Contractors in every way possible.

The Contractor shall have on the project at all times a competent superintendent, acting as an authorized agent, capable of reading and thoroughly understanding the plans and specifications and thoroughly experienced in the type of work being performed, who shall receive instructions from the Operations Administrator or an authorized representative. The superintendent shall have the full authority to execute orders or directions of the Operations Administrator without delay and to promptly supply such materials, equipment, tools, labor and incidentals as may be required. Such superintendence shall be furnished irrespective of the amount of work sublet.

Where the work extends across private property, the Contractor shall conduct operations in strict conformity with the terms and conditions of the easements and agreements obtained from the owners of the property. The City will not provide any points of access to any of these easements other than at points shown or described in the agreement with the property owner. Arrangements for the use of any additional points of access shall be made with the property owners by the Contractor at the Contractor's own expense.

The Contractor agrees to confine the work under this contract to the strict dimensions of easements, rights-of-way, or other work area authorized in writing by the City. Any failure of the Contractor, or the Contractor's agents, servants and employees to restrict the work in the defined area shall be the sole liability and responsibility of the Contractor who further agrees to save the City harmless from any activity of the Contractor's agents, servants, employees and subcontractors where such activity concerning work under this contract extends beyond the defined work area. The Contractor also agrees that where operations extend outside prescribed work areas, the City has the absolute right to suspend the work unless written evidence indicates permission from the property owner.

If the Contractor disperses any or all of its equipment to an area outside the work limits of the project, for any reason whatsoever, the re-marshaling and re-grouping of the equipment back to the work area shall be at the Contractor's expense. If the Contractor has been granted permission by the Operations Administrator to remove said equipment from the work area, then, at the discretion of the Operations Administrator, consideration may be given as to the amount of the City's participation, if any.

105.06 Night Work and Sundays. The Contractor agrees that all work on this contract which includes any and all subcontractors shall be only during the period from one-half hour before sunrise and one-half hour after sunset as sunrise and sunset are determined by the U. S National Weather Service.

No work shall be permitted on Sundays unless authorized by the Operations Administrator.

Authorization of work during any other time shall only be upon written permission by the Operations Administrator, or as detailed on the plans or in the proposal, special provisions or supplemental specifications.

Failure of the Contractor to comply or failure of the Contractor to control any and all of his subcontractors for work under the contract to comply with the above provisions shall be cause to make all such work performed subject to removal and replacement at no additional expense to the City.

105.07 Work on National Holidays. No work will be permitted on National Holidays as listed in 101. 33 except as authorized or directed by the Operations Administrator. The provisions of 105. 06 shall apply with equal force to this provision.

105.08 Cooperation with Utilities. During the course of plan preparation for an improvement, the City shall notify all utility companies, all pipe line owners or other parties affected and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines and other appurtenances within or adjacent to the limits of construction made as soon as possible so as not to interfere with the progress of the work. During the course of construction, the Contractor shall be solely responsible for notifying any utility or other service when such service is encountered as provided hereinafter.

The Contractor shall be solely and completely responsible for all above ground utilities, structures, and appurtenances, in regard to protection or replacement of same. The Contractor shall also be solely responsible for below ground utilities, structures, and appurtenances that may be accurately located by removing manhole covers, valve box covers, and other access point coverings, with reasonable effort using hand tools for such removal. The cost of protecting and/or replacing the utilities, structures, and appurtenances covered by this paragraph shall be borne solely by the Contractor and included in the various bid items in the contract.

Existing surface or overhead structures or utility lines are not necessarily shown on the drawings and those shown are only approximately correct. The Contractor shall make such investigations as are necessary to determine the extent to which existing surface or overhead structures may interfere with the prosecution of the work contemplated under this contract.

Existing subsurface structures or utility lines including sewer service connections but excluding all other service connections, which may be encountered during the construction of the work embraced under this contract or are located in such close proximity to the work under this contract as to require special precautions or methods for their protection, such as sewers, drains, sewage force mains, water mains, gas mains, telephone and electric conduits, together with appurtenances, are shown in the plans and drawings, insofar as there is public record of their existence. The sizes, locations and depths shown are only approximately correct and the Contractor shall make such investigations or explorations as may be necessary to verify the accuracy of the information given. Furthermore, it is recognized that the exact locations of water mains are unknown, hence the Contractor shall, if so ordered, uncover and locate these mains ahead of the excavation for the work required by these specifications.

In accordance with Ohio Revised Code Section 153. 64, at least two working days prior to commencing construction operations, the Contractor shall notify the Operations Administrator, the registered utility protection service and the owners of each underground and overhead utility facility not members of the registered utility protection service.

Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cable-ways, signals and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners at their expense, except as otherwise provided for in the special provisions or as noted on the plans.

Water mains, services and appurtenances owned and/or maintained by the Division of Water, Department of Public Utilities, City of Columbus, Ohio shall be adjusted as indicated on the drawings or as specified at the Contractor's cost and expense in a manner approved by the Division of Water Department of Public Utilities, City of Columbus, Ohio, and no separate payment will be made unless a separate item is included in the contract therefore.

It is understood and agreed that the Contractor has considered in the Contractor's proposal all permanent and temporary utility appurtenances in their present or relocated positions and that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by the Contractor due to any interference from said utility appurtenances or the operation of moving them, except that in those cases where, after written notification from the Contractor, the Operations Administrator determines that the character of the work to be performed or the cost thereof or the time provided therefore has been materially changed by such delays without the fault or negligence of the Contractor, an equitable adjustment shall be made.

If, through no fault of the Contractor, the progress of contract work is delayed for an unreasonable length of time from that proposed in the progress schedule of 108. 02 because of failure of a utility company to relocate or adjust its lines, the Contractor shall immediately file with the City a detailed statement describing the nature of the delay and its effect upon contract work progress.

It is the complete responsibility of the Contractor to determine the exact location of all substructures and utility lines of public utility facilities including but not limited to water, sewer, traffic, and electricity pipes or conduits shown on the plans including services lines not shown whether or not located on private property, public property, public or private right of ways, or public or private easements and of all surface or overhead structures, including but not limited to utility lines, telephone or electrical poles, growing things such as trees, sidewalks and driveways.

The Contractor shall have sole responsibility for paying for any damage done directly or indirectly to the above mentioned items as a result of the progress of the work performed under this contract, whether performed by the Contractor or the Contractor's subcontractor(s), agents, servants or employees, whether such damage results from negligence or otherwise, and whether the damage is to private or public property or real or personal property. The Contractor further agrees to save the City harmless from any such damages.

In the event that the Contractor fails to pay the entire cost of the damages as stated above within thirty days, or in the event litigation arises as a result of such damages, the Operations Administrator shall have the unqualified right to deduct and withhold the entire amount of the damages from the monies due or to become due to the Contractor until said damages are liquidated and the City is kept whole from any such expense.

The Contractor further covenants not to sue the City, either in law or equity, where such deduction and withholding is made by the City.

The City shall return, within a reasonable time thereafter not to exceed thirty days, the amount of the withheld funds which exceed the amount of damages paid by the City.

The Contractor further waives any and all rights, title or interest in any and all amounts of damages and court costs paid by the City.

105.09 Cooperation Between Contractors. The City reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct its work so as not to interfere with or hinder the progress or completion of the work being performed by other contractors. Contractors working on the same project shall cooperate with each other as directed.

Each contractor involved shall assume all liability, financial or otherwise, in connection with his contract and shall protect and save harmless the City from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by him because of the presence and operations of other contractors working within the limits of the same project.

Each contractor shall arrange its work and shall place and dispose of the materials being used so as not to interfere with the operations of the other contractors within the limits of the same project. Each contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

105.10 Construction Stakes, Lines and Grades. The Contractor shall furnish and place construction layout stakes for the project in accordance with 623 of the CMSC. The Contractor shall notify the City at least two working days prior to the time that control points for line and grade will be needed. There shall be no compensation to the Contractor for the cost occasioned by delay in establishing lines, grades and elevations or making other necessary measurements or by inspection; but such costs shall be considered as having been included in the price stipulated for doing the work called for in the contract.

All construction staking shall be performed under the supervision of a registered professional engineer or land surveyor. All field notes, cut sheets, etc. , shall be submitted to the City.

105.11 Photographs and Videos. From time to time during the progress of the work, photographs or videos of the work may be taken by the Operations Administrator, inspectors or

other duly authorized City personnel or agents, at no expense to the Contractor. The Contractor shall, however, furnish access to the work at all times for this purpose and shall furnish such assistance as may be required. The photographs or videos thus taken shall be the property of the City. Nothing herein contained shall be construed as prohibiting the taking of photographs or videos by the Contractor or its agents, provided, however, that it is done at no cost or expense to the City.

105.12 Authority and Duties of the Inspector. Inspectors employed by the City will be authorized to inspect all work and materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. Inspectors are not authorized to alter or waive the provisions of the contract, but shall have the authority to reject materials which do not meet specification requirements and to suspend the portion of the work involved until any question at issue can be referred to and decided by the Operations Administrator. Inspectors are not authorized to issue instructions contrary to the plans and specifications, or to act for the Contractor.

105.13 Inspection of Work. All materials and each part or detail of the work shall be subject to inspection by the Operations Administrator. The Operations Administrator or an authorized representative of the Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Operations Administrator requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed, will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by the Operations Administrator or an authorized representative of the Operations Administrator may be ordered removed and replaced at the Contractor's expense. Failure to reject any defective work or material shall not in any way prevent later rejection when such defects be discovered, or obligate the City to final acceptance.

When any unit of government or political subdivision or railroad or any corporation is to pay a portion of the cost of the work covered by this contract, its respective representatives shall have the right to inspect the work. Such inspection shall in no sense make any unit of government or political subdivision or railroad or any corporation a part to this contract, and shall in no way interfere with the rights of either party hereunder.

105.14 Unauthorized Work. No work shall be done without control points having been given by the City. Work done contrary to the instructions of the Operations Administrator, work done beyond the control points, or any extra work done without authority will be considered as

unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the Operations Administrator under the provisions of this section, the Operations Administrator will have authority to cause unauthorized work to be removed and to deduct the costs from any monies due or to become due to the Contractor.

105.15 Load Restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads. A special permit will not relieve the Contractor from the Contractor's sole liability for damage which may result from the moving of equipment or materials, whether caused by the equipment of the Contractor or the Contractor's subcontractors.

The operation of equipment of such weight or so loaded as to cause damage to structures or the roadway or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course of a roadway under construction shall be limited as directed by the Operations Administrator. No loads will be permitted on a concrete pavement, base or structure before the expiration of the curing period. In no case shall legal load limits be exceeded unless permitted in writing. The Contractor shall be responsible for all damage done by the equipment of the Contractor or the Contractor's subcontractors.

105.16 Maintenance During Construction. The Contractor shall maintain the work during construction and until the project is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces to the end that the roadway, conduits or structures are kept in satisfactory condition at all times.

In the case of a contract for the placing of a paving course upon a roadway subgrade previously constructed, the Contractor shall maintain the previous paving course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various pay items, and the Contractor will not be paid an additional amount for such work.

105.17 Failure to Maintain Roadway or Structures, Traffic Control Facilities and Other Appurtenance. If the Contractor, at any time, fails to comply with the provisions of 105. 17, the Operations Administrator will immediately notify the Contractor of such non-compliance. If the Contractor fails to remedy unsatisfactory maintenance within twenty-four hours after receipt of such notice, the Operations Administrator may immediately proceed to maintain the project and the entire cost of this maintenance will be deducted from monies due or to become due the Contractor on this contract.

105.18 Borrow and Waste Areas. The terms "borrow area" and "waste area" as used in the specifications refer to locations outside the right-of-way from which natural materials are removed for use in the work or upon which materials from the work are to be deposited as waste.

Before any borrow or waste disposal operations are to begin, the Contractor shall submit his plan for operation, control of drainage water, cleanup, shaping, and restoration of the disturbed areas and obtain the Operations Administrator's written approval. The plan of operations shall include the saving of topsoil, and proposed measures to keep sediment and other contaminants from entering streams, lakes, and reservoirs by the use of methods such as diversion channels, dikes, sediment traps, and vegetation covers, etc. When it becomes necessary to locate such areas in or near streams, special precautions shall be taken.

The stability of borrow and waste areas and any damage to surrounding property resulting from movement of the area shall be the sole responsibility of the Contractor.

Restoration of all borrow or waste areas shall include cleanup, shaping, replacement of topsoil and establishment of vegetation cover by seeding and mulching in accordance with the requirements of 659 of the CMSC at no additional cost to the City. The restored area shall be well drained unless approval is given to convert a pit area into a pond or lake, in which case restoration measures shall be confined to the disturbed areas above the anticipated normal water level.

The cost of work described herein necessary to secure these results shall be included in the contract price bid for these items to which they apply.

105.19 Use of Fire Hydrants. The Contractor shall make the proper arrangements with the Dublin Service Department and the Division of Water, Department of Public Utilities, City of Columbus, Ohio for the use of fire hydrants when used for work performed under this contract.

Before the final estimate is paid, the Contractor shall submit a letter from the Division of Water, Department of Public Utilities, City of Columbus, Ohio, to the Operations Administrator stating that the Contractor and all subcontractors have returned the Siamese Valve to the Division of Water, Department of Public Utilities, City of Columbus, Ohio, and paid all costs arising from the use of the fire hydrants.

105.20 Claims.

(A) Early Notice. In the event the Contractor learns of circumstances ("Circumstances") perceived by the Contractor to be likely to give rise to a claim, the Contractor shall immediately inform the Operations Administrator of the Circumstances ("Early Notice"). The Contractor waives any part of the claim for costs incurred from the time the Contractor learns of the Circumstances and before the Contractor notifies the Operations Administrator of same.

Notice of Claim. In the event the Contractor and the Operations Administrator disagree as to the responsibility of the parties under the contract concerning the Circumstances ("Disagreement"), then the Contractor shall submit to the Operations Administrator in writing within ten calendar days after the Contractor learns of the Disagreement, a Notice of Claim setting forth insofar as possible, the basis and the nature of the claim. The failure of the Contractor to timely submit a Notice of Claim constitutes a waiver of his right to any claim due to the Circumstances.

Estimates of Additional Costs and/or Time. Within ten calendar days of the date of submission of the Notice of Claim, the Contractor shall submit in writing to the Operations Administrator the Contractor's estimate of the additional cost to be incurred and any additional time required. If the Contractor fails to submit his estimate of additional cost and/or any additional time required within ten calendar days or such later date as agreed to with the Operations Administrator, the claim is abandoned and waived.

Records. From the time the Contractor learns of the Circumstances, the Contractor shall maintain complete and specific records of all matters relating to the preserved claim. The Operations Administrator shall have access to such records upon request.

Continuation of Work. Unless otherwise agreed to in writing, the Contractor shall, after giving Early Notice, continue with and carry on the work during the pendency of the claim, and the City will continue to make progress payments to the Contractor in accordance with the contract documents.

(B) Submission of Claim. As promptly as possible following the submission of the Notice of Claim, but in no event later than sixty calendar days after substantially all of the Contractor's costs are known to a reasonable certainty, the Contractor shall submit the claim to the Operations Administrator. If the Contractor fails to submit the claim within said sixty calendar days or such later date as agreed to with the Operations Administrator, the claim is abandoned and waived.

Content of Claim. The claim shall set forth clearly and in detail, for each item of additional compensation or extension of time requested:

(a) The reasons for the claim.

(b) References to the applicable provisions of the contract documents.

(c) The nature and the specific cost ascribed to each element of the claim and for each period of time involved.

(d) The basis used in describing each such element of cost or for each period of time.

(e) Any other pertinent factual data.

Any claim, which in the opinion of the Operations Administrator is deficient in documentation, shall either be returned to the Contractor with comment as regards to the deficiencies or the Operations Administrator may, at the Operations Administrator's option, request additional information. The Contractor shall either furnish the additional information requested by the Operations Administrator within fifteen days of the request or such later time as agreed to with the Operations Administrator or state in writing to the Operations Administrator that the Contractor cannot or will not furnish such additional information, or the claim is abandoned and waived.

(C) The Decision of the Operations Administrator. The Operations Administrator shall render a written decision within sixty calendar days of the later of the date of receipt of the claim or the date of receipt of the supplemental information requested by the Operations Administrator. A failure of the Operations Administrator to render a decision within said sixty calendar days or such later time as agreed to with the Contractor constitutes a decision of denial. The decision of the Operations Administrator is final subject to an election by the Engineer to submit the matter to an alternative form of dispute resolution.

(D) Alternative Dispute Resolution. At the Operations Administrator's option and direction, the claim shall be submitted to arbitration, mediation, or some other form of alternative dispute resolution.

105.21 Moving of Equipment. Non-rubber tired vehicles or equipment shall not be moved on City streets. Exceptions may be granted by the Operations Administrator where short distances and special circumstances are involved. Exceptions must be in writing and any resulting damage must be repaired to the satisfaction of the Operations Administrator.

106. - CONTROL OF MATERIAL

106. 01 Source of Supply and Quality Requirements
106. 02 Samples, Tests, Cited Specifications
106. 03 Plant Inspection
106. 04 Storage of Materials
106. 05 Handling of Materials
106. 06 Unacceptable Materials
106. 07 City-Furnished Material

106.01 Source of Supply and Quality Requirements. The materials used on the work shall meet all requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Operations Administrator of the proposed sources of materials prior to delivery. At the option of the Operations Administrator, materials may be inspected at the source of supply before delivery is started. If it is determined by the Operations Administrator after trial, that sources of supply for previously approved materials do not produce specified products the Contractor shall furnish materials from other sources which shall, in turn, be subject to controls set forth herein.

The Contractor shall furnish or cause to be furnished delivery tickets or documents for all materials to be incorporated in the work, which tickets or documents shall describe in detail the type, size, specification or data, fully denoting the material being delivered.

106.02 Samples, Tests, Cited Specifications. All materials will be inspected, tested and compliance determined by the Operations Administrator before incorporation into the work. Unless otherwise designated, tests shall be made in accordance with AASHTO, ASTM or other methods on file in the Office of the Engineer. Except as provided in 105. 03, tests shall be made at the expense of the City. Samples will be taken by a qualified representative of the City.

References included in these specifications to AASHTO, ASTM or Federal Specifications shall be the test method, sampling method or specification as amended to its issue date next preceding the bid opening date.

All materials being used are subject to inspection, test or rejection at any time prior to incorporation into the work. Copies of all tests will be furnished to the Contractor's representative. The Contractor, in all cases, shall furnish the required samples without charge.

Transports and distributors hauling bituminous material shall be equipped with an approved submerged bituminous material sampling device.

If, in the judgment of the Operations Administrator, the quantity used of any one material is so inconsequential as to not warrant testing in accordance with the minimum requirements for sampling materials in Chapter 900 of the CMSC, verification of the quality of the material may be covered by a Field Inspection Report of Materials, prepared by the Operations Administrator.

106.03 Plant Inspection. The Operations Administrator or an authorized representative may undertake the inspection of materials at the source.

In the event plant inspection is undertaken the following conditions shall be met:

(a) The Operations Administrator shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

(b) The Operations Administrator or an authorized representative shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.

8 If required by the Operations Administrator, the Contractor shall arrange for an approved building for the use of the inspector; such building to be located conveniently near the plant, independent of any building used by the material producer.

(d) Adequate safety measures shall be provided and maintained.

It is understood that the City reserves the right to re-test all materials prior to incorporation into the work which have been tested and accepted at the source of supply after the same have been delivered and to reject all materials which, when re-tested, do not meet the requirements of the specifications, or those established for the specific project.

106.04 Storage of Materials. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the right-of-way may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefor must be provided by the Contractor at no expense to the City. Private property shall not be used for storage purposes without written permission of the owner or lessee,

and if requested by the Operations Administrator, copies of such written permission shall be furnished. All storage sites shall be restored to their original condition by the Contractor at no expense to the City.

106.05 Handling of Materials. All materials shall be handled in such manner as to preserve their quality and fitness for the work. Aggregate shall be transported from the storage site to the work in tight vehicles so constructed as to prevent loss or segregation of materials after loading and measuring in order that there may be no inconsistencies in the quantities of materials intended for incorporation in the work as loaded, and the quantities as actually received at the place of operations.

106.06 Unacceptable Materials. All materials not conforming to the requirements of the specifications at the time they are used shall be considered unacceptable and shall be removed immediately from the site of the work unless otherwise instructed by the Operations Administrator. No materials, the defects of which have been corrected, shall be used until approval has been given. Upon failure on the part of the Contractor to comply immediately with any order of the Operations Administrator made under the provisions of this section, the Operations Administrator shall have authority to remove and replace defective materials and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

106.07 City-Furnished Material. The Contractor shall furnish all materials required to complete the work, except when otherwise provided in the proposal.

Materials furnished by the City will be delivered or made available to the Contractor at the points specified in the special provisions.

The cost of handling and placing all materials after they are delivered to the Contractor shall be considered as included in the contract price for the item in connection with which they are used.

The Contractor will be held responsible for all delivered materials, and deductions will be made from any monies due the Contractor to make good any shortages and deficiencies, from any cause whatsoever, and for any damage which may occur after such delivery, and for any demurrage charges.

107. - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107. 01 Laws to be Observed
107. 02 Permits, Licenses and Taxes
107. 03 Patented Devices, Materials and Processes
107. 04 Restoration of Surfaces Opened by Permit
107. 05 Federal Aid Provisions
107. 06 Sanitary Provisions
107. 07 First Aid
107. 08 Public Convenience and Safety
107. 09 Barricades and Warning Signs
107. 10 Maintenance of Traffic
107. 11 Use of Explosives
107. 12 Protection and Restoration of Property
107. 13 Responsibility for Damage Claims
107. 14 Contractor's Responsibility for Work
107. 15 Contractor's Responsibility for Utility Property and Services
107. 16 Furnishing Right-of-Way
107. 17 Personal Liability of Public Officials
107. 18 No Waiver of Legal Rights
107. 19 OSHA

107.01 Laws to be Observed. The Contractor shall keep fully informed of all federal, state and local laws, ordinances, and regulations and all orders and decrees of authorities having any jurisdiction or authority, which in any manner affect those engaged or employed in the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the City and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's subcontractor(s), agents or employees.

The Contractor agrees that in the hiring of employees for the performance of work under this contract or any subcontract hereunder, neither the Contractor nor any of the Contractor's subcontractors, nor any person acting on behalf of the Contractor or any of its subcontractors, shall, by reason of race, creed or color, discriminate against any citizen of the United States in the employment of labor or workers, who is qualified and available to perform the work to which the employment relates and that neither the Contractor nor any of the Contractor's subcontractors, nor any of their employees or agents shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed or color.

107.02 Permits, Licenses and Taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

Prior to the closure of or working in or on any portion of a street the Contractor shall obtain a permit through the Operations Administrator.

107.03 Patented Devices, Materials and Processes. If the Contractor employs any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the City, any affected third party or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process or any trademark or copyright, and shall indemnify the City for any costs, expenses, and damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution of or after the completion of the work.

In the case of patented pavements and wearing courses, where royalties, licensing and proprietary service charges, exacted or to be exacted by the patentees, are published and certified agreements are filed with the City, guaranteeing to prospective bidders free unrestricted use of all such proprietary rights and trademarked goods upon payment of such published charges, such patented payments may be specifically designated in the proposal and competition secured upon the item exclusive of the patent or proprietary charges.

107.04 Restoration of Surfaces Opened by Permit. The right to construct or reconstruct any utility service in the highway or street or to grant permits for same, at any time, is hereby expressly reserved by the Operations Administrator, and the Contractor shall not be entitled to any damages either for the digging up of the street or for any delay occasioned thereby.

Any individual, firm, or corporation wishing to make an opening in the street must secure a permit through the Operations Administrator. The Contractor shall allow parties bearing such permits, and only those parties, to make openings in the street. When ordered by the Operations Administrator, the Contractor shall make in an acceptable manner all necessary repairs due to such openings and such necessary work will be paid for as extra work, or as provided in these specifications, and will be subject to the same conditions as original work performed.

107.05 Federal Aid Provisions. When the United States Government pays all or any portion of the cost of a project, the Federal laws and the rules and regulations made pursuant to such laws must be observed by the Contractor and the work shall be subject to the inspection of the appropriate federal agency.

Such inspection shall in no sense make the federal government a party to this contract and will in no way interfere with the rights of either party hereunder.

107.06 Sanitary Provisions. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees and City representatives as may be

necessary to comply with the requirements of the state and local boards of health, or of other authorities having jurisdiction.

107.07 First Aid. The Contractor shall provide and keep upon the work a completely equipped first aid kit and shall provide ready access thereto at all times when workers are employed on the work. The Contractor shall designate some proper person or persons to be in charge of administering first aid and shall cause such person or persons to receive proper instructions therein.

107.08 Public Convenience and Safety. The Contractor shall at all times so conduct contract work as to assure the least possible obstruction to traffic. The safety and convenience of the general public and the residents along the street and the protection of persons and property shall be provided for by the Contractor as specified under 104. 05.

The Contractor shall provide and maintain safeguards, safety devices and protective equipment and take any other needed actions as may be necessary to protect the public and property in connection with the work.

The presence of barricades or lights, provided and maintained by any party other than the Contractor, shall not relieve the Contractor of this responsibility.

107.09 Barricades and Warning Signs. Temporary traffic control devices and facilities shall be furnished, erected, maintained and paid for in accordance with the provisions of 614 of the CMSC (Maintaining Traffic). All traffic control devices shall conform to Part 7 of the OMUTCD for Streets and Highways as amended, as required under Ohio Revised Code Section 4511. 09. The provisions of this item and this section shall not in any way relieve the Contractor of any of the Contractor's legal responsibilities or liabilities, for the safety of the public.

107.10 Maintenance of Traffic. All work shall be performed in accordance with 614 of the CMSC, except that unless an item for maintaining traffic is included in this contract, the cost of this work shall be included in the prices bid for the various items of the contract and there will be no separate payment made there for.

To avoid interruption of bus and coach operations, the Contractor shall give sufficient advance notice to the company or companies concerned, to permit rerouting of lines, if necessary, prior to the commencement of work.

When material is piled in the gutters, suitable drains of sufficient size to carry all the storm water flowing in the gutters, shall first be laid. Where the drainage from cross streets or alleys is interfered with or cut off by reason of the nature of the work, suitable crossings shall be provided for pedestrians. No material shall be piled within twenty feet of any fire hydrant.
The Contractor shall notify the appropriate fire department, and the City of Dublin Police Department whenever a street or section of street is about to be closed to traffic and also when it is to be opened.

107.11 Use of Explosives. Blasting shall not be permitted. Under certain special conditions, the Operations Administrator may request blasting. In such cases, the Contractor shall use the highest degree of care and adequate protective measures so as not to endanger life, completed portions of the project, and all other property, both public and private. Before conducting any blasting operations, the Contractor shall furnish the Operations Administrator, in writing, a schedule of intended blasting operations and the Contractor shall give the Operations Administrator prior written notification of any changes in such schedule. The Contractor shall provide proof of special hazard insurance as set forth under 103. 08.

The use, handling, storage and transportation of explosives shall conform and be in accordance with the applicable requirements and/or provisions of:

(a) the latest revision of "State of Ohio Administrative Code Chapter 4121:1-3," issued by the Department of Industrial Relations and the Industrial Commission of the State of Ohio;

(b) the Ohio Explosive Laws, Ohio Revised Code Sections 3743. 01 - 3743. 26;

8 local regulations; and

(d) as specified herein.

The Contractor shall secure a written permit from the appropriate fire department before any blasting work is begun.

Except in the case of continuous tunnel operations, all blasting shall be conducted during daylight hours only with the provision that when required by the Operations Administrator, blasting shall be limited to certain daylight hours. All firing shall be done by electrical means or any suitable, manufactured, non-electric blasting system which allows the blaster to control the exact moment in which firing of the shot will occur. The Contractor shall make suitable provisions to prevent the scattering of broken rock, earth, stones or other material during blasting operations.

107.12 Protection and Restoration of Property. The Contractor shall be responsible for the preservation of all public and private property.

The Contractor shall be responsible for all damage or injury to property during the prosecution of the work, resulting from any act omission, neglect, or misconduct in any manner or method of executing the work, or at any time due to defective work or materials.
Dust, mud, noise or other nuisance originating from any plant operations either inside or outside the right-of-way shall be controlled by the Contractor in accordance with local ordinances and regulations at the sole expense of the Contractor.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work; or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore such

property to a condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding or otherwise restoring as may be directed by the Operations Administrator, or shall make good such damage or injury in an acceptable manner. The cost of all work associated with said restoration shall be at no additional cost to the City.

The Contractor shall cooperate with the Operations Administrator in protecting and preserving cornerstones and monuments that may be within the right-of-way. The Contractor shall not start grading or resurfacing operations until the Operations Administrator has referenced all known cornerstones, monuments and land-markers in the area to be improved. Monuments, cornerstones and land-markers unexpectedly encountered shall be protected, referenced and preserved in the same manner.

When cornerstones, monuments and land-markers are encountered in the performance of the work, and monument covers are not listed in the proposal, the City will furnish them and supervise their precise location and installation, and the Contractor will furnish all the labor, tools and other materials required incidental to such installations. Any labor, tools and materials so furnished shall be paid for as force account work.

The cost to the City for repair, re-evaluation of location and replacement of any cornerstone, monument or land-marker within the project, damaged, destroyed, or made inaccessible during the progress of the work by the Contractor or the Contractor's employees, in violation of these provisions, is a charge deductible from any estimate payable on account of the work.

107.13 Responsibility for Damage Claims. The Contractor and the surety shall save harmless the City and all of its representatives, or any participating railroad or railway company, from all suits, actions, or claims of any character brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work or through the use of unacceptable materials in the construction of the improvement or on account of any act or omission, by the Contractor, or its agents. The Contractor or the Surety shall pay any judgment obtained or growing out of any such claims or suits.

107.14 Contractor's Responsibility for Work. Until final written acceptance of the project by the Operations Administrator, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, from vandalism, from vehicular accidents, or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God, of the public enemy or governmental authorities.

In case of suspension of work by the Contractor, or under the provisions of 105. 09, the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project, provide for adequate drainage and shall erect any necessary temporary structures, signs, or other facilities at the Contractor's expense. During such

period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

107.15 Contractor's Responsibility for Utility Property and Services. At points where the Contractor's operations are adjacent to properties of railway, telegraph, telephone, and power companies, or are adjacent to other utilities or property, damage to which might result in considerable expense, loss, or inconvenience, work shall not be commenced until all arrangements necessary for the protection thereof have been made.

The Contractor shall cooperate with the owners of any underground or overhead utility lines in their protection and in removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangement work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event of interruption to water or utility services as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate with the said authority in the restoration of service. If water or sewer service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the appropriate fire department.

107.16 Furnishing Right-of-Way. The City will be responsible for the securing of all necessary rights-of-way in advance of construction deemed necessary by the City. Any exceptions will be indicated in the contract.

107.17 Personal Liability of Public Officials. In carrying out any of the provisions of the specifications, or in exercising any power or authority granted to them by or within the scope of the contract, there shall be no liability upon the City Manager, the Operations Administrator, or their authorized representatives, either personally or as officials of the City, it being understood that in all such matters they act solely as agents and representatives of the City.

107.18 No Waiver of Legal Rights. Neither the inspection by the Operations Administrator, nor by any inspector or duly authorized City representatives nor any order, measurements, or certificate by the Operations Administrator, or said representatives, nor any order by the Operations Administrator, for the payments of money, nor any payment for, nor acceptance of any work by the Operations Administrator, nor any extension of time, nor any possession taken by the City or its duly authorized representatives, shall operate as a waiver of any provision of this contract, or of any power herein reserved to the City, or any right to damages herein provided; nor shall any waiver of any breach of this contract be held to be a waiver of any other subsequent breach.

107.19 OSHA. All Contractors shall comply with the provisions of the Occupational Safety and Health Act of 1972 and all amendments thereto.

108. - PROSECUTION AND PROGRESS

108. 01 **Subletting of Contract**
108. 02 **Prosecution and Progress**
108. 03 **Suspension of Work**
108. 04 **Limitation of Operations**
108. 05 **Character of Workers, Methods, and Equipment**
108. 06 **Date for Completion**
108. 07 **Liquidated Damages**
108. 08 **Cancellation of Contract**
108. 09 **Certified Payroll**

108.01 Subletting of Contract. The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or contracts or any portion thereof, or of its right, title, or interest therein, without written consent of the Operations Administrator. In case such consent is given, the Contractor will be permitted to subcontract a portion thereof, but shall perform with the Contractor's own organization, work amounting to not less than fifty percent of the total contract cost, except that any items set forth in the proposal to be "specialty items" may be performed by subcontract and the cost of any such specialty items so performed by subcontract may be deducted from the total cost before computing the amount of work required to be performed by the Contractor's own organization. No subcontract, or transfer of contract, shall in any case release the Contractor of liability under the contract and bonds.

108.02 Prosecution and Progress. The Contractor shall submit a progress schedule on an approved form within ten days after the Notice to Proceed has been issued showing how the Contractor proposes to prosecute the work. If the Contractor's operations are materially affected by changes in the plan or in the amount of the work or if the Contractor has failed to comply with the approved schedule, the Contractor shall submit a revised progress schedule, if requested by the Operations Administrator, which schedule shall show how the Contractor proposes to prosecute the balance of the work. The Contractor shall submit the revised progress schedule within ten days after the date of the request. The Contractor shall incorporate into every progress schedule submitted, any contract requirements regarding the order of performance of portions of the work. The Contractor shall use all practicable means to make the progress of the work conform to that shown on the progress schedule which is in effect. Acceptance by the City of the revised progress schedule shall not serve as a time extension approval. Any extension of the contract completion date must be processed per 108. 06. No payment will be made to the Contractor while the Contractor is delinquent in the submission of a progress schedule. Should the prosecution of the work, for any reason, be discontinued, the Contractor shall notify the Operations Administrator at least one working day in advance of resuming operations. No payment will be made to the Contractor if the Contractor is delinquent in the submission of a progress schedule. Should the prosecution of the work, for any reason, be discontinued, the Contractor shall notify the Operations Administrator at least two working days in advance of resuming operations.

On contracts which are complicated and interdependent in nature, a Critical Path Method type progress diagram may be required by the special provisions to the contract.

Progress schedules and diagrams are to be included in unit price bids of the various contract items, unless a specific bid item is included in the contract.

108.03 Suspension of Work. The Operations Administrator may instruct the Contractor to delay the start of operations or suspend the Contractor's operations in whole or in part, for the length of time the Operations Administrator may deem necessary. The Contractor shall start or resume the operations when notified to do so by the Operations Administrator.

If, without the fault or negligence of the Contractor, the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of the Operations Administrator in the administration of the contract or by failure to act within the time specified in the contract (or if no time is specified within a reasonable time), an adjustment shall be made by the Operations Administrator for any increase in the cost of performance of the contract (excluding profit) necessarily caused by the unreasonable period of such suspension, delay, or interruption, and the contract shall be modified in writing.

If construction under these specifications if suspended, delayed, or interrupted through no fault of the Contractor by an order of a court of competent jurisdiction or the Environmental Protection Agency, such suspension, delay, or interruption will be considered to be an unreasonable suspension, delay, or interruption.

In the event that additional expense or loss due to suspension includes machinery or equipment idled by such act or failure to act, payment therefore may be allowed only for machinery or equipment actually on the project site required for those phases of the construction work to which such order applies, and such payment shall be made at the following rates: for idled machinery or equipment owned by the Contractor, fifty percent of the rental price; and for idled machinery or equipment rented by the Contractor, the actual rental price paid plus fifteen percent thereof. The maximum rental price shall be as set forth in the current Equipment Guide Blue Book.

108.04 Limitation of Operations. The Contractor shall conduct the work at all times in such a manner and in such sequence as will assure the least interference with traffic and other operations of the public. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic. The Contractor shall not open up work to the prejudice or detriment of work already started. The Operations Administrator may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

108.05 Character of Workers, Methods, and Equipment. The Contractor shall at all times employ sufficient competent labor and equipment for prosecuting the several classes of work to full completion in the manner and time required by these specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such

work and in the operation of the equipment required to perform all work properly and satisfactorily.

Any person employed by the Contractor or by any subcontractor who, in the opinion of the Operations Administrator, does not perform their work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Operations Administrator, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without the approval of the Operations Administrator. Should the Contractor fail to remove such person or persons as required above, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Operations Administrator may withhold all estimates, which are or may become due, or may suspend the work by written notice until the Contractor complies with such orders.

All equipment which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet the requirements of the work and produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that no injury to the roadway, adjacent property, or other streets or highways will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the contract, the Contractor is free to use any methods or equipment that is demonstrated to the satisfaction of the Operations Administrator will accomplish the contract work in conformity with the requirements of the contract.

When the contract specifies that the construction be performed by the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Operations Administrator. If the Contractor desires to use a method or type of equipment other than those specified in the contract, the Contractor may request authorization from the Operations Administrator to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed to be used and an explanation of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing construction work in conformity with contract requirements. If, after trial use of the substituted methods of equipment, the Operations Administrator determines that the work produced does not meet the contract requirements, the Contractor shall discontinue the use of the substitute methods or equipment and shall complete the remaining construction with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality at no expense to the City, or take such other corrective action as directed by the Operations Administrator. No change will be made in basis of payment for the construction items involved nor in contract time as a result of authorizing a change in methods or equipment under these provisions.

108.06 Date for Completion. The Contractor shall have completed the work on or before the calendar date specified in the contract or on or before a later date determined as specified herein, otherwise the Operations Administrator shall proceed as provided in 108. 07 or 108. 08.

If the contract is revised in any material respect and it is determined that said revision will cause delay in the completion of the work, the Operations Administrator will postpone the completion

date by the number of calendar days determined to be equitable. If the Contractor finds it impossible for reasons beyond the Contractor's control to complete the work by the date as specified or as extended in accordance with the provisions of this section, the Contractor at any time prior to the expiration of the contract time as extended, may make a written request to the Operations Administrator for an extension of time setting forth therein the reasons which will justify the granting of the Contractor's request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Operations Administrator finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, then an extension of the time for completion in such amount as the conditions justify may be granted.

The extended time for completion shall then be in full force and effect the same as though it were the original time for completion.

If the Operations Administrator should suspend the work in whole or in part as provided in 108. 03, the date for completion shall be postponed the number of days that the suspension directly or indirectly delays the completion of the work.

108.07 Liquidated Damages. For each calendar day that any work shall remain uncompleted after the contract completion date, the sum specified herein will be deducted from any money due the Contractor, not as a penalty but as liquidated damages; provided however, that due account shall be taken of any adjustment of the completion date granted under the provisions of 108. 06. If the proposal contains a special provision for liquidated damages it shall be used in lieu of the schedule contained herein.

The Contractor shall complete the work by the calendar date specified in the contract, or by a later date determined in accordance with 108. 06. Requests for extension of the completion date shall be in writing and shall be submitted to the Operations Administrator, prior to the calendar date set for completion in the proposal. Failure to request an extension of the completion date, in writing, prior to the calendar date set for completion in the proposal and/or per 108. 06, will AUTOMATICALLY cause the deduction of liquidated damages, as set forth in 108. 07 or the proposal, from all estimates due and payable to the Contractor after such completion date.

Permitting the Contractor to continue and finish the work or any part of it after the date fixed for its completion, or after the date to which completion may have been extended, will in no way operate as a waiver on the part of the City of any of its rights under the contract.

The Operations Administrator may waive such portions of the liquidated damages as may accrue after the work is in condition for safe and convenient use.

In addition to the amounts specified hereinafter for each calendar day after the completion date, the Contractor will be charged for all inspection services regardless of any extension of time granted, unless such charges are waived by the Operations Administrator.

SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for Each Calendar Day of Overrun in Time
From More Than	To and Including	
$ 0	$ 25,000	$ 100. 00
25,001	50,000	150. 00
50,001	100,000	200. 00
100,001	500,000	300. 00
500,001	1,000,000	500. 00
1,000,001	2,000,000	750. 00
2,000,001	5,000,000	1,000. 00
5,000,001	10,000,000	1,500. 00
Over $10,000,001		2,000. 00

108.08 Certified Payroll. The Contractor shall submit to the Prevailing Wage Coordinator of the City a weekly copy of all project employee payrolls for the duration of the time of construction. The copy shall be accompanied by a certified statement, signed by the Contractor or an agent of the Contractor, indicating that the payrolls are correct and complete and that the wage rates contained therein are not less than those required by the prevailing wage rates in the contract, or any subsequent revision of wage rates during the life of the contract. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

The Contractor shall make employment records available for inspection by authorized representatives of the City and will permit employees to be interviewed during working hours by these representatives.

All weekly payrolls shall contain or have attached the following:

1) the name and employer identification number of each employee;
2) the current address of the employee;
3) the job classification of the employee (same as shown on wage determination or provisional approval);
4) rate of pay;
5) hours worked each day and total for each week;
6) fringe payments and deductions made.

Failure to furnish and submit the above information as part of the required weekly Certified Payroll will be cause for the City to withhold the preparation of the monthly estimate. In the event of a violation of the wage rate provisions by the Contractor or any subcontractor, the City may, after notice to the Contractor, suspend further payments or proceed to terminate the contract as provided by other sections of the contract.

109. - ACCEPTANCE, MEASUREMENT AND PAYMENT

109. 01 Measurement of Quantities
109. 02 Scope of Payment
109. 03 Compensation for Altered Quantities
109. 04 Extra and Force Account Work
109. 05 Eliminated Items
109. 06 Partial Payments
109. 07 Payment for Material on Hand
109. 08 Final Inspection and Acceptance
109. 09 Final Estimate
109. 10 Release of Liability
109. 11 Guarantee

109.01 Measurement of Quantities. Where work is to be paid for by units of length, area, weight or volume, all work accepted under this contract will be measured by the Operations Administrator, and the quantities of various items of work performed will be determined by the Operations Administrator, as the basis for final settlement.

For the calculation of quantities in which the computation of area by geometric methods would be comparatively laborious, it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.

109.02 Scope of Payment. The Contractor shall receive and accept compensation provided in the contract as full payment for furnishing all materials and equipment for performing all work under the contract in a complete and acceptable manner and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, except as otherwise provided in 104. 02, 105. 22 and 107. 14.

If the "Basis of Payment" clause in the specifications relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid under any other pay item which may appear elsewhere in the specifications.

109.03 Compensation for Altered Quantities. When the accepted quantities of work vary from the quantities in the bid schedule, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract unit prices for the accepted quantities of work done. No allowance except as provided in 104. 02 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations or indirectly from

unbalanced allocation among the contract items of overhead expense on the part of the bidder and subsequent loss of expected reimbursements therefor or from any other cause.

Increased work involving supplemental agreements shall be paid for as stipulated in such agreements. The Contractor shall furnish substantiating data required in the preparation of these agreements. The costs of increased work shall be developed using guidelines of 109. 04.

109.04 Extra and Force Account Work. Extra work performed in accordance with the requirements and provisions of 104. 03 will be paid for at the unit prices or lump sum stipulated in the order authorizing the work, or the City may require the Contractor to do such work on a force account basis to be compensated in the following manner:

(a) Labor. For all labor and for all foremen in direct charge of the specific operations, the Contractor shall receive the rate of wage and fringe benefits currently in effect at the time the work is performed for each and every hour that said labor and foremen are actually engaged in such work, to which may be added an amount equal to thirty percent of the sum thereof. The term fringe benefits shall be defined as the actual costs paid to, or in behalf of, workers by reason of health and welfare benefits, pension fund benefits or other benefits, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work. In addition to the above the Contractor shall receive the actual cost of Social Security Tax, Workers' Compensation and State and Federal Unemployment Insurance. In lieu of itemizing these four items, fifteen percent of the sum of wages and fringe benefits may be added.

The wages of any supervisor or timekeeper who is employed partly on force account work and partly in other work, shall be prorated between the two classes of work according to the number of men employed on each class of work as shown by the payrolls.

The Contractor shall receive the actual costs paid for subsistence and travel allowances when such payments are required by collectible bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work. No percentage may be added to these costs.

(b) Materials. For materials accepted by the Operations Administrator and used, the Contractor shall receive the actual cost of such materials delivered on the work, including transportation charges paid (exclusive of machinery rentals as hereinafter set forth), to which cost fifteen percent may be added.

(c) Equipment. For machinery or special equipment other than small tools which it may be deemed necessary or desirable to use, the Contractor shall be allowed a rental price to be agreed upon in writing before such work is begun, for the time that such equipment is in use on the work. No profit or overhead shall be added to any charges in connection with the use of owned equipment, however fifteen percent of the basic amount payable for rented equipment may be added for overhead and profit. Proper invoices will be required for rental equipment. The maximum rental price shall be as set forth in the current Equipment Guide Blue Book.

(d) Supervisor's Transportation. A flat hourly rate, which includes fuel and lubricants, profit and overhead, and any other costs will be allowed for the supervisor's transportation.

(e) Fuel and Lubricants. For all equipment except the supervisor's transportation (for which an all inclusive flat rate is allowed) fifteen percent of the basic equipment allowance may be added for cost of fuel and lubricants unless the Blue Book rate includes such fuel and lubricants.

(f) Subcontract Work. For work performed by an approved subcontractor the Contractor will be allowed an amount to cover administrative costs, equal to five percent of the compensation provided in (a), (b) (c), (d), and (e) but not exceeding $5,000. 00.

(g) Compensation. The compensation to the Contractor as above provided in (a), (b), (c), (d), (e) and (f) shall constitute payment in full for extra work done on a force account including administrative, superintendence, overhead, use of tools and equipment for which no rental is allowed, profit, taxes other than sales tax, premium on insurance, and any other expense incidental to performing the force account work. Sales tax will not be allowed on any item for which tax exemption may be obtained.

(h) Statements. Final payment will not be made for work performed on a force account basis until the Contractor has furnished the Operations Administrator with quadruplicate itemized statements of the cost of such force account work detailed as follows:

(1) Name, classification, date, daily hours, total hours, rate, and extension for each laborer and supervisor.

(2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

(3) Quantities of materials, prices, and extensions.

(4) Transportation of materials.

The Contractor's representative and the Operations Administrator shall compare records daily of the cost of work done as ordered on a force account basis. The Operations Administrator shall certify that these records are correct.
Statements shall be accompanied and supported by proper invoices for all materials used, transportation charges, and rented equipment performing work on force account operations. However, if materials used on the force account work are not specifically purchased for such work, but are produced by the Contractor or taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were produced by or taken from the Contractor's stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor. Statements shall be filed not later than the twentieth day of the month following that in which the work was actually performed.

The above described force account provisions will also apply to work performed at agreed unit prices and agreed lump sums when the agreed prices are based on analyses of cost of labor, material and equipment.

109.05 Eliminated Items. Should any items contained in the proposal be found unnecessary for the proper completion of the work, the Operations Administrator may, upon written order to the Contractor, eliminate such items from the contract, and such action shall in no way invalidate the contract. When the Contractor is notified of the elimination of items, the Contractor will be reimbursed for actual work done and all costs incurred, including mobilization of materials prior to said notification.

109.06 Partial Payments. On or about the first of each month, the Contractor shall prepare and submit to the Operations Administrator for approval, an estimate of the amount of labor performed and/or acceptable materials delivered to the site.

Progress payments shall be at the rate of ninety-two percent (92%) of the amount certified by the Operations Administrator until the work is fifty percent (50%) complete as determined by the Operations Administrator, from which time progress payments shall be at the rate of one hundred percent (100%) of the amount certified by the Operations Administrator with no further funds being retained.

When the project is substantially completed and occupied, or in use, or otherwise accepted, and there exists no other reason to withhold retainage, the retained funds shall be paid to the Contractor, withholding only that amount necessary to assure completion of the work. Retained funds shall be paid to the Contractor with interest thirty days from the date of final completion or either acceptance or occupancy by the City.

Partial payments may, at any time, be withheld, if in the opinion of the Operations Administrator, the work is not proceeding in accordance with the provisions of 108.02.

Before the second partial payment estimate is processed and for each subsequent partial estimate thereafter, the Contractor will be required to submit a notarized affidavit confirming that all bills for materials and for subcontracted work represented by the previous partial payment have been paid. Should any defective work, material or acceptable work that has been damaged by the Contractor's operations be discovered previous to the final acceptance or should a reasonable doubt arise previous to the final acceptance as to the integrity of any part of the completed work, the estimate and payment for such defective or questioned work shall not be allowed until the defect has been remedied and cause for doubt removed, by and at the expense of the Contractor upon the order of the Operations Administrator.

109.07 Payment for Material on Hand. Partial payments may be made to the extent of the delivered cost of approved materials to be incorporated in the work, when delivered on the project or stored in acceptable storage places in the vicinity of the project. Delivered cost shall be evidenced by manufacturer's invoices bearing the statement that all previous invoices have been paid.

The Contractor shall make application for payment for materials on hand or stored on forms provided by the Operations Administrator. Information will be required as to the cost of the materials, when such materials will be incorporated in the work and such other information which will be considered for approval of advanced payment. Consideration will only be given to materials for major items of the contract.

109.08 Final Inspection and Acceptance. When the Contractor completes all or portions of the work to be accepted by the City, a request for a final inspection by the Contractor shall be made. If items remain which must be completed or remedied by the Contractor, the Contractor shall perform the work immediately upon being notified by the Operations Administrator. When such items have been corrected by the Contractor, final inspection will be made. The work must pass final inspection before it will be accepted by the City.

Where the City has made a final inspection and has accepted any portion of the work, the retained percentage for the entire contract will be appropriately reduced for the portion of the work accepted.

109.09 Final Estimate. As soon as practicable after the acceptance of the work by the City, there shall be issued a final estimate for payment based on the actual quantities of completed and accepted work performed under this contract. Such final estimates shall be approved by the Operations Administrator, after which the City shall pay the entire sum found to be due, after deducting all previous payments made under 109.06. All prior estimates are subject to correction in the final estimate payment.

The date of approval of the final estimate by the Operations Administrator shall be the date of acceptance for the project.

109.10 Release of Liability. No person or corporation other than the signer of this contract as Contractor, has any interest hereunder and no claim shall be made or be valid, and neither the City, nor any official or agent thereof, shall be liable for or be held to pay any money except as provided herein. The acceptance by the Contractor of payment shall operate as and shall be a release to the City, and every officer and agent thereof, from all claims and liability to the Contractor for anything done or furnished for, or relating to the work, or for any act or neglect of the City, or of any person relating to or affecting the work.

109.11 Guarantee. When any work is accepted by the City there shall be a guarantee period extending for one year from the date of acceptance of the work. The City will designate on the plans or in the proposal those portions of the project which may be accepted prior to completion of the entire project. If during the course of the construction, the City desires to accept and place in operation any additional portions of the work, written notification will be given to the Contractor by the City.

At any time during the guarantee period, the City may notify the Contractor and his surety that certain repairs are necessary. Within ten days after being so notified, the Contractor shall make such repairs as are declared necessary to restore the work to a good and serviceable condition. Specifications for the work performed under this contract shall govern in the making of repairs

under this section. In the event that the Contractor fails to comply with the order to repair as provided, said repairs may be made by the City and it is hereby agreed by the Contractor that reimbursement shall be made to the City for said expense so incurred within ten days following the receipt of a statement rendered to the Contractor by the City for said expense. Further, the Contractor will receive no recognition as a bidder for any future work of the City for a period of three years.

If the cost of providing security to the City for the one year guarantee period is prohibitive, the Contractor may, with approval of the Operations Administrator, make an assignment of bonds or other form of acceptable security to the City in the amount of five percent of the contract cost for the duration of the guarantee period.

PAYROLL INFORMATION

I, _____ (Name), _____(Title) of _____ (Subcontractor/Contractor), state the following:

1. That I pay or supervise the payment of the persons employed by _____ (Subcontractor/Contractor) on the above-referenced project.

2. That during the payroll period commencing on the _____ day of _____, 2016, and ending on the _____ day of _____, 2016, all persons employed on said project have been paid the full weekly wages earned; that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ (Contractor/Subcontractor) from the full weekly wages earned by such persons; and that no deductions have been made either directly or indirectly from the full wages earned by such persons, other than permissible deductions as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c), and described below:

   _____

   _____

   _____

3. That any payrolls otherwise under this Agreement for Construction (the "Agreement") required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in the specifications as supplied by the Department of Industrial Relations or any wage determination incorporated into the Agreement; and that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

4. That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with the Ohio Apprenticeship Council.

5. That (check applicable box):

a. WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS:

In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above-referenced payroll, payments of fringe benefits listed in the Agreement have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 48 below.

b. WHERE FRINGE BENEFITS ARE PAID IN CASH:

Each laborer or mechanic listed in the above-referenced payroll has been paid as indicated on the payroll, and amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the Agreement, except as noted in Section 48 below.

c. Exceptions:

Exception (Craft):	Explanation:
_____	_____
_____	_____
_____	_____
_____	_____

Remarks:

_____

_____

_____
(Signature)

_____
(Print Name and Title)

The willful falsification of any of the above statements may subject the Contractor or Subcontractor to fines as described in Section 4115.99 of the Ohio Revised Code.

FINAL PAYROLL AFFIDAVIT

STATE OF _____
COUNTY OF _____, SS:

I, _____ (Affiant), _____ (Title) of _____ (Contractor/Subcontractor), do hereby certify that:

1. The Payroll Information reports submitted on behalf of (Contractor/Subcontractor) for this project are correct.

2. The wages paid to all employees for the full number of hours worked in connection with the Agreement for Construction (the "Agreement") for the above-referenced project during the period from _____ to _____ is in accordance with the prevailing wages prescribed by the Agreement.

3. No rebates or deductions for any wages due any person have been directly or indirectly made other than those provided by law.

_____
(Signature of Affiant)

_____
(Print Name)

Sworn to and subscribed in my presence this ___ day of _____, 2016.

_____
Notary Public

The above affidavit must be executed and sworn to by the officer or agent or the Contractor/Subcontractor who supervised the payment of employees, before the City of Dublin, Ohio will release the surety and/or make final payment due under the terms of the Agreement.

SECTION 5
SPECIFICATIONS

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221119	Domestic Water Piping Specialties
221120	Non-potable water piping
221316	Sanitary waste and vent piping
224000	Plumbing Fixtures

DIVISION 26 ELECTRICAL

260101	Electrical Demolition
260500	Common Work Results for Electrical
260519	Low-Voltage Electrical Power Conductors and Cables
260526	Grounding and Bonding for Electrical Systems
260533	Raceways and Boxes for Electrical Systems
262726	Wiring Devices
265100	Interior Lighting

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Section 011100 - Summary

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under a single prime contract.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

B. Related Section:

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

1.3 PROJECT INFORMATION

A. Project Identification: Project # 16-002.1-FAC Pool Renovations.

1. Project Location: Dublin Recreation Center, Dublin, Ohio.

B. Owner: City of Dublin.

1. Owner's Representative: Tim Elmer (614) 410-4709

C. Engineer: Osborn Engineering

1. Bryan Lundgren (614) 556-4272.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The City of Dublin will be replacing Autofill sensors and pool lights (including conduit and cables to and from) for the Lap pool, Leisure Pool and Whirlpool for the Base Bid. They will also be replacing the perimeter trench drains for the Lap pool with the trench drains for the Leisure pool being replaced as Alternate 1.

B. The Type of Contract

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

1.5 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.6 COORDINATION WITH OCCUPANTS

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

1.7 WORK RESTRICTIONS

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

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

B. On-Site Work Hours: Limit work to normal business working hours of 7:30 a.m. to 6:00 p.m., Monday through Friday, except as otherwise indicated.

1. Weekend Hours: With Written Permission of the Owner.
2. Early Morning Hours: Not Allowed.
3. Hours for Utility Shutdowns: With Written Permission of the Owner.

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

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

E. Employee Identification: Owner will provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.

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

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

1.8 SPECIFICATION AND DRAWING CONVENTIONS

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

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011100

Section 013100 – Project Management and Coordination

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. General coordination procedures.
2. Requests for Information (RFIs).
3. Project meetings.

B. The single prime contractor shall participate in coordination requirements.

C. Related Requirements:

1. Section 01 70 00 "Execution Requirements" for procedures for coordinating general installation and field-engineering services.

1.3 DEFINITIONS

A. RFI: Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 GENERAL COORDINATION PROCEDURES

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

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

3. Make adequate provisions to accommodate items scheduled for later installation.

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

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

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

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

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

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

1.5 REQUESTS FOR INFORMATION (RFIs)

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

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

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

1. Project name.

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

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

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

    1. Attachments shall be electronic files in Microsoft Office File formats.

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

    1. The following Contractor-generated RFIs will be returned without action:

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

    2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.

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

1. Project name.
2. Name and address of Contractor.
3. Name and address of Engineer.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within three days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

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

1. Attendees: The Single Prime Contractor shall inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
2. Agenda: The Single Prime Contractor shall prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: The Single Prime Contractor shall be responsible for conducting the meeting and will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.

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

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

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.

d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for processing field decisions and Change Orders.
g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.
l. Preparation of record documents.
m. Use of the premises.
n. Work restrictions.
o. Working hours.
p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

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

C. Progress Meetings: The Single Prime Contractor shall conduct progress meetings at biweekly intervals.

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

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

1) Review schedule for next period.

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

Section 013216 – Construction Progress Schedule

PART 1 GENERAL

1.1 SUMMARY

A. The purpose of the Construction Progress Schedule is to allow the Schedule Manager to prepare an orderly plan to aid in the timely completion of the Project.

1. For clarity, this Section uses the term Schedule Manager for activities performed by the Single Prime Contractor depending on the party with contractual responsibility for their timely completion in accordance with paragraph 4.2.3 of the applicable General Conditions.

B. The approved Construction Progress Schedule will be used to plan and execute the work, to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis for all progress payments.

C. Contractors shall cooperate and coordinate with each other, and with the Engineer and the Owner, to provide all scheduling requirements in their respective schedules in accordance with the Contract Documents.

D. Failure to maintain the Construction Progress Schedule in an approved status may result in the Contracting Authority withholding a monetary penalty against the responsible Contractor(s) until the schedule is approved.

E. Related Sections:

1. Division 00 Document - General Conditions
2. Division 00 Document - Supplementary Conditions

1.2 PROJECT SCHEDULING SEQUENCE REQUIREMENTS

A. The Schedule Manager will prepare a Construction Progress Schedule for all work included under the scope of each Contract, in accordance with the General Conditions.

1. The Schedule Manager will schedule and conduct a Schedule Kick-Off Meeting. Contractors are required to attend.

a. The Schedule Manager will prepare and furnish to all contractors a Master Activity Coding template, in hard copy and disk, defining the Responsibility Code, Work Area Code, Milestones, Phase Code, etc. for the Construction Progress Schedule, as outlined in this section. Contractors shall submit subsequent schedule requirements in accordance with the

Master Activity Code template to achieve continuity in merging scheduling input.

b. The Schedule Manager will prepare and distribute a schedule framework of proposed construction sequence to the Contractors.

2. The Schedule Manager will prepare and furnish a detailed schedule framework, in hard copy and disk, to the Contractors.

a. Contractors shall utilize the detailed schedule framework to prepare their Construction Progress Schedule for their specific scope of work.

b. The Schedule Manager will schedule and conduct a minimum of two Schedule Sequence Review Meetings with mandatory attendance by all Contractors to meet the Construction Progress Schedule submission requirement within 5 calendar days after the Notice to Proceed is issued.

B. Contractors shall provide Construction Progress Schedule requirements specified herein to the Schedule Manager so that they can prepare a fully coordinated Construction Progress Schedule.

1. The Singe Prime Contractor shall include Schedule Consultant Services in their bid and procure Schedule Consultant services to meet these requirements, in accordance with the General Conditions.

C. The Schedule Manager will submit the Construction Progress Schedule through the Single Prime Contractor, if applicable, with signatures indicating approval by all contractors to the Engineer.

1. If acceptable, the Engineer and Contracting Authority will accept the schedule.

2. If not acceptable, the schedule will be returned to the Schedule Manager for revision. The revised schedule, with approval signatures for all Contractors, shall be resubmitted.

PART 2 PRODUCTS

2.1 SCHEDULE SOFTWARE

A. The computer software utilized by the Schedule Manager to produce the project schedule will be Primavera Products as marketed by Primavera Systems, Inc. or a substitution accepted by the Contracting Authority.

PART 3 EXECUTION

3.1 CRITICAL PATH METHOD

A. The Critical Path Method (CPM) of network calculations will be used to generate the schedule. The Schedule Manager shall provide the schedule in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM).

3.2 LEVEL OF DETAIL REQUIRED

A. With the exception of the preliminary schedule submission, the Construction Progress Schedule shall include an appropriate level of detail. Failure of the Schedule Manager to develop or update the schedule or provide resource information will result in the disapproval of the schedule.

B. Activity Durations:

1. Submit the following data to support the schedule calendar as it relates to durations. Failure of the Schedule Manager to include this data will delay the review of the submittal until the Engineer receives the missing data.

    a. The proposed number of working days per week.
    b. The holidays to be observed during the life of the contract (by day, month and year).
    c. The planned number of shifts per day.
    d. The number of hours per shift.
    e. Break up the work into activities of a duration no longer than 20 work days each, except as to non-construction activities (e.g., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities for which the Owner may approve a longer duration.

C. Procurement Activities:

1. Prepare the schedule in chronological order of submittals. Show specification section of the submittal, name of contractor and generic description of work covered. Include activities to cover the complete procurement process to include but not limited to: submittal, review, approval, resubmittal, procurement, fabrication, delivery, permits, and similar pre-construction work.

D. Manpower:

1. Activities shall have an estimate of the average number of workers per day that are expected to be used during the execution of the activity.
2. Identification of manpower, material, or equipment restrictions, as well as any activity requiring unusual shift work, such as two shifts per day, six day work

week, specified overtime, or work at times other than regular days or hours shall clearly be identified in the Project Schedule.

3. Critical or near Critical Paths resulting from the use of manpower or equipment restraints shall be kept to a minimum. Near Critical Paths are defined as paths having 10 workdays or less of total float.

E. Cost:

1. All activities shall be cost loaded in a logical manner tying to each Contractor's Schedule of Values.

F. Responsibility:

1. All activities shall be identified in the Construction Progress Schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the Contracting Firm, the Subcontracting Firm, Contractor Workforce, or Agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

G. Work Areas:

1. Arrange the schedule to show each major area of construction for each major category or unit of work.
2. All activities shall be identified in the Construction Progress Schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

H. Change Order or Claim Number:

1. Any activity that is added or changed by a change order or used to justify any claimed time, shall be identified by change order code that changed the activity. Activities may not belong to more than one change order.

I. Milestones:

1. Milestone dates are defined in calendar days following the date set forth in the Notice to Proceed and are required to be met by all Contractors. Time is of the essence for the completion of Milestones and for the Contract Completion date.
2. The following Milestone dates are defined in calendar day from the Notice to Proceed, and shall be adhered to by each Contractor.

    a. Milestone M1 – Project Completion 60 calendar days.

3.3 SCHEDULED PROJECT COMPLETION

A. Project Start Date:

1. The Construction Progress Schedule may start no earlier than the date that the Notice to Proceed (NTP) was issued. The Schedule Manager shall include as the first activity in the Construction Progress Schedule an activity called "Notice to Proceed." The "Notice to Proceed" activity shall have: an "ES (early start) constraint, a constraint date equal to the date that the NTP was issued, and a zero day duration.

B. Constraint of Last Activity:

1. Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the Critical Path. The Schedule Manager shall include as the last activity in the Project Schedule an activity called "Contract Complete". The "Contract Complete" activity shall have a: "LF" (late finish) constraint, a constraint date equal to the completion date equal to the date identified in the NTP for the project, and a zero day duration.

3.4 INTERIM COMPLETION DATES (MILESTONES)

A. Contractually specified interim completion dates (Milestone dates) shall also be constrained to show negative float if early finish date of the last activity in that phase falls after the interim completion date.

3.5 HAMMOCK ACTIVITIES FOR CONTRACTS

A. The Schedule Manager shall include a hammock type activity for each Contractor. The Contractor activity shall be logically tied to the earliest and latest activities in the Contractor's Scope of Work. Hammock activities shall be identified within "HA" at the beginning of the Activity ID.

3.6 DEFAULT PROGRESS DATA DISALLOWED

A. Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM Scheduling Software Systems. Actual Start and Finish dates and Remaining Durations on the CPM Schedule shall match those dates provided from Contractor Daily Reports for every in progress or completed activity and insure that the data contained on the Daily Reports is the sole basis for schedule updating. Failure to comply may result in the disapproval of schedule.

3.7 OUT OF SEQUENCE PROGRESS

A. Activities that have posted progress without predecessors being completed (Out of Sequence Progress) shall be allowed only by the case by case approval of the Owner. The Engineer may direct that changes in schedule logic be made to correct any or all Out of Sequence Work.

3.8 NEGATIVE LAG(S)

A. Lag durations contained in the schedule shall not have a negative value.

3.9 DEFINITION OF, AND CONDITIONS RELATING TO FLOAT

A. Float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity in the schedule. Total float is defined as the amount of time any given activity or path of activities may be delayed before it will affect the project completion time.

B. Float is not time for the exclusive use or benefit of the Contractor, and shall be used in the best interest of completing the project on time.

C. Extensions of time for performance required under the General Conditions pertaining to equitable time adjustment will be granted only to the extent that the equitable time adjustment exceeds total float in the activity or path of activities affected at the time approval was issued for the change.

D. Use of float suppression techniques such as preferential sequences, special lead/lag logic restraints, extended activity times, or imposed dates, other than as required by the Contract, shall be cause for rejection of the Construction Progress Schedule and any revisions or updates.

3.10 PRELIMINARY CONSTRUCTION PROGRESS SCHEDULE

A. The preliminary Construction Progress Schedule, defining the Contractor's planned operations for the first 30 calendar days shall be submitted for approval within 5 calendar days after Notice to Proceed is issued. The approved preliminary schedule shall be used for payment purposes and the basis for measuring Contractor progress not to exceed 30 days after Notice to Proceed is issued.

1. Paper copies shall be provided in color on minimum 11 inch by 17 inch paper.

B. Schedule Review and Comments

1. Comments made by the Engineer on the Construction Progress Schedule during review shall not relieve the Contractors from compliance with the requirements of the Contract Documents.
2. Following the Contractor's receipt of the Engineer's review comments, the Contractors shall correct the schedule to identify missing activities and relationships relevant to the Scope of Work. No time extensions will be granted to complete activities not initially included in the Contractor's Construction Progress Schedule.
3. To the extent that there are any conflicts between the approved Construction Progress Schedule and the requirements of the Contract Documents, the Contract Documents shall govern.

C. Re-submittal of Construction Progress Schedule

1. Should the Engineer reject the Construction Progress Schedule, the Schedule Manager shall comply with the Engineer's direction and resubmit the Construction Progress Schedule and all associated submittals within 7 calendar days.

3.11 APPROVED CONSTRUCTION PROGRESS SCHEDULE

A. The Construction Progress Schedule approved by the Contractors shall be submitted for acceptance within 5 calendar days after the Notice to Proceed is issued. It shall provide a reasonable sequence of activities which represent work through the entire project and a reasonable level of detail.

1. Paper copies shall be provided in color on minimum 11 inch by 17 inch paper.

B. The approved Construction Progress Schedule shall show the sequence and interdependence of activities required for complete performance of the work, beginning with Contractor's receipt of the Notice to Proceed and concluding with the date of Final Completion of the Contract. The Construction Progress Schedule shall show all activities in workdays, with allowance for holidays and the effects of normal weather conditions on outside work.

C. The approved Construction Progress Schedule shall comply with all limits imposed by the Scope of Work, with all contractually specified intermediate milestones and completion dates, and with all constraints, restraints, or sequences included in the Contract.

D. The Construction Progress Schedule network (graphic presentations) and computer tabulations, the Resource Loading curve and the Contractor's signatures shall be submitted to the Engineer for acceptance. Additionally, the Schedule Manager shall submit two copies of the data, containing the resource loaded Construction Progress Schedule.

E. The following computer generated reports in hard copy shall be required as part of the Preliminary and Approved Construction Progress Schedule submittals:

1. Activity ID Report
2. Total Float/Early Start Report
3. Logic Report
4. Resource Report
5. Coding Dictionary

F. The schedule network (graphic presentation) shall include:

1. Activity ID
2. Activity Description
3. Original Durations
4. Remaining Durations
5. Early Start and Finish Dates
6. Baseline Start and Finish Dates
7. Total Float
8. Percent Complete

G. The schedule shall be sorted by Early Start and Total Float and shall show both the Early and Target Schedule.

H. The Owner shall accept or reject, in writing, the Construction Progress Schedule and the associated submittals. If the Construction Progress Schedule is rejected, the Owner shall provide comments in writing to the Schedule Manager stating the reasons why the submission was not accepted.

3.12 Periodic Schedule Updates

A. The following computer generated reports in hard copy and on computer diskettes shall be required as a part of the monthly update thereof as a condition precedent to the receipt of progress payments under the Contract.

B. The Contractor's monthly narrative report is to include:

1. Activities started in the month (with actual start dates).
2. Activities completed during the month (with actual start and completion dates).
3. Activities in progress (with estimated remaining durations).
4. Activities scheduled to start in the next month (with estimated start dates).
5. A list of approved logic changes.
6. A list of proposed logic changes, new activities, and deleted activities.
7. Recommendations for adjusting the Construction Progress Schedule to meet milestone completion and Contract completion dates (include why the schedule needs adjusted, e.g., change order, weather, contractor resources, etc.).

a. Construction Contract Adjustment for Unexpected Adverse Weather

1) Contract adjustment is justified when the number of actual adverse weather work days exceeds the expected number of adverse weather work days over the life of the project.
2) The number of actual adverse weather work days and related construction task(s) are to be reported on a monthly basis at the last Progress Meeting of the month as a condition of Payment Application approval.
3) The Engineer is to verify with documentation the actual adverse weather work days reported by each Contractor.
4) The calculation of the difference between the actual adverse working weather days and expected adverse weather working days is to be reported at the first Progress Meeting of the month by the Engineer.

8. Attach copies of the Contractors' weekly schedule reports.

C. The Contractors graphic presentation of the schedule is to include:

1. Activity ID.
2. Activity Description.
3. Original Durations.
4. Remaining Durations.
5. Early Start and Finish Dates.
6. Baseline Start and Finish Dates.
7. Total Float.
8. Percent Complete.
9. The schedule shall be sorted by Early Start and Total Float and should show both the early schedule and the target schedule.

D. Electronic data supporting the update shall be provided.

E. Computer generated reports are to include:

1. Activity ID Report.
2. Total Float/Early Start Report.
3. Logic Report.
4. In Progress or Planned to Start Report.
5. In Progress or Planned to Finish Report.
6. Resource Report.

3.13 TWO-WEEK LOOK AHEAD SCHEDULE SUBMISSION

A. The Schedule Manager shall provide a two-week Look Ahead Schedule for review at the Progress Meeting that occurs closest to the 15th of each month. The Look Ahead Schedule will be based on the most recent monthly update and will show only those

activities that are scheduled to begin or are in progress during the week before and for two weeks after the 15th of the current month. The two-week Look Ahead Schedule reports will contain the following information for each activity and will be required from the Contractor throughout the duration of the project unless directed otherwise by the A/E.

1. Activity I.D.
2. Activity Description
3. Original Duration
4. Remaining Duration
5. Early Start Date
6. Early Finish Date
7. Percent Complete
8. Total Float
9. Bar Graph Presentation

3.14 STANDARD ACTIVITY CODING DICTIONARY

A. The Schedule Manager shall submit, with the Construction Progress Schedule, a coding scheme that shall be used throughout the project for all activity codes contained in the schedule. The coding scheme submitted shall list the values for each activity code category and translate those values into project specific designations. For example, A Responsibility Code Value, “ELE”, may be identified as “Electrical Subcontractor”. Activity code values shall represent the same information throughout the duration of the contract. Once approved with the Preliminary (first 5 calendar days) Project Schedule Submission, changes to the activity coding scheme shall be approved by the Engineer.

3.15 DATA

A. The preliminary, approved, and update Construction Progress Schedules shall be provided in the form of electronic files.

B. File Medium:

1. Submit data on media acceptable to the Contracting Authority.

C. Disk Label:

1. The Schedule Manager shall affix a permanent exterior label to each disk submitted. The label shall indicate the type of schedule (preliminary, target, update or change), full contract number, project name, project location, data date, name and telephone number of person responsible for the schedule, and file name.

D. File Name:

1. The Schedule Manager shall insure that each file submitted has a name related to the schedule data date, project name, or contract number. The Schedule Manager shall develop a naming convention that will insure that the names of all the files submitted are unique. The Schedule Manager shall submit the file naming convention to the Engineer.

E. OAKS Capital Improvements

1. If the Project is administered using OAKS CI, the Construction Progress Schedule and associated data shall be submitted to the Engineer through the Schedule Approvals business process.

3.16 APPROVED CHANGES VERIFICATION

A. Only Construction Progress Schedule changes that have been previously approved by the Engineer shall be included in the schedule submission. The narrative report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

B. The Contractor shall prosecute the work in accordance with the approved Construction Progress Schedule. Out of sequence construction, defined as a change from the Construction Progress Schedule in the Contractor's actual operation requires prior approval from the Engineer.

C. Upon the approval of a change order or the issuance of a unilateral change order by the Contracting Authority the agreed upon change order activities, activity durations, logic and impacts shall be reflected in the next schedule submittal by the Schedule Manager.

D. No change to the approved activities, original activity durations, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the Construction Progress Schedule shall be made without prior approval from the Engineer. If the Contractor desires to make a change to the approved Construction Progress Schedule, the Contractor shall request permission from the Engineer in writing, stating the reasons for the change as well as the specifics, such as the proposed changes in activities, original activity durations, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the baseline Construction Progress Schedule. The Engineer shall respond within 3 calendar days after the receipt of the Contractor's request.

E. If the Engineer considers the Construction Progress Schedule change requested by the Contractor to be a major change, it may require the Contractor to revise and submit for approval, without additional cost to the Owner, all of the affected portions of the network diagrams, and any schedule reports, or construction equipment reports deemed necessary to show the probable effect on the entire project. The proposed network revision and required reports shall be submitted to the Engineer within seven calendar days after the

Engineer notifies the Contractor that the requested revision is a major change. Only upon the approval of the requested change by the Engineer may it be reflected in the next Construction Progress Schedule update submitted by the Contractor.

F. A change will be considered of a major nature if the time estimated for an activity or sequence of activities is varied from the original plan to the degree that there is reasonable doubt that the Contract Completion date or milestones will be met, or if the change impacts the work of other Contractors at the job site. Changes to activities having adequate float may be considered as minor changes, except that an accumulation of minor changes may be considered a major change when such changes affect the Contract Completion date or milestones.

3.17 SCHEDULE REPORTS

A. The format of each activity for the schedule reports listed below shall contain:

1. Activity ID Number(s).
2. Activity Description.
3. Original Duration.
4. Remaining Duration.
5. Early Start Date.
6. Early Finish Date.
7. Baseline Start Date.
8. Baseline Finish Date.
9. Total Float.
10. Actual Start and Actual Finish dates shall be printed for those activities in progress or completed.

B. Activity ID Report: A list of all activities sorted according to Activity ID number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

C. Logic Report: A list of preceding and succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

D. Total Float Report: A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates.

3.18 NETWORK DIAGRAM (GRAPHIC PRESENTATION)

A. The network diagram is required on the preliminary, baseline and monthly schedule submissions. The network diagram shall depict and display the order and interdependence

of activities and the sequence in which the work is to be accomplished. The A/E will use, but is not limited to, the following conditions to review compliance with this paragraph:

1. Continuous Flow: Diagrams shall show a continuous flow from left to right. The Activity ID, description, original duration, remaining duration, early start and finish dates, target start and finish dates, total float and percent completed shall be shown on the diagram.
2. Project Milestone Dates: Dates shall be shown on the diagram from start of any project, any contract required interim completion dates, and contract completion dates.
3. Critical Path(s): The Critical Path(s) shall be clearly shown.
4. Banding: Activities shall be grouped to assist in the clear understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.19 CONSTRUCTION PHOTOGRAPHS

A. The Engineer shall furnish digital photographs that show progress, work that is concealed, problem areas, etc. Each photograph shall be identified with: project name, exact location and the orientation of the photograph. Electronic file naming should be consistent with the identification requirements for each photograph. At the completion of the project the Engineer shall provide the City of Dublin with a CD containing all construction photographs filed by date having file names that clearly identify each photograph and location.

END OF SECTION 013216

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Section 013300 – Submittal Procedures

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections:

1. Division 00 Section "Compensation and Payment" for submitting Applications for Payment and the schedule of values.

1.3 DEFINITIONS

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

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

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

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

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering,

manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action, informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Engineer's final release or approval.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Engineer's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

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

C. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow 3 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer

will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Re-submittal Review: Allow 3 days for review of each re-submittal.

D. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Name file with submittal number or other unique identifier, including revision identifier.

   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., BFTF-061000.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., BFTF-061000.01.A).

2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information on an inserted cover sheet:

   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name of Contractor.
   e. Name of firm or entity that prepared submittal.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Related physical samples submitted directly.
   m. Other necessary identification.

E. Options: Identify options requiring selection by the Engineer.

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

G. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will discard submittals received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:

   a. Project name.
   b. Date.

c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Indication of full or partial submittal.
j. Drawing number and detail references, as appropriate.
k. Submittal and transmittal distribution record.
l. Remarks.
m. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

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

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

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

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

1. Submit electronic submittals via email as PDF electronic files.

a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.

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

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

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

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

4. Submit Product Data before or concurrent with Samples.
5. Submit Product Data in the following format:

   a. PDF electronic file.

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

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

   a. Identification of products.
   b. Schedules.

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

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

a. PDF electronic file.

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for

use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit two sets of Samples. Engineer will retain one Sample sets; remainder will be returned.

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

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

1. Type of product. Include unique identifier for each product.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

a. PDF electronic file.

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

G. Application for Payment: Comply with requirements specified in Division 00 Section "Payment Procedures."

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

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

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

K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of

Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

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

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

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

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

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

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

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

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

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

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

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

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file one paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

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

3.2 ENGINEER'S ACTION

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

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

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

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

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

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

END OF SECTION 013300

Section 014000 – Quality Requirements

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

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

1.3 DEFINITIONS

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

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

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

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

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

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

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

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

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

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 INFORMATIONAL SUBMITTALS

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

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

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

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

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

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 5 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

1.8 QUALITY ASSURANCE

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

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

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

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

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

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

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

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

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

1.9 QUALITY CONTROL

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

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

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

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

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

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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

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

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

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

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

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

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspecting equipment at Project site.

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

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

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the

Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

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

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Engineer.

4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

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

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

END OF SECTION 014000

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Section 015000 – Temporary Facilities and Controls

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Engineer, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

C. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations and inspections.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site features including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

C. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 00 Section "Construction and Closeout."

END OF SECTION 015000

Section 017000 – Execution Requirements

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section, including – but not limited to – the following.

1. Section 013300 – Submittal Procedures.

1.2 SUMMARY

A. The Work of this Section includes:

1. Examination, preparation, and general installation procedures.
2. Pre-installation meetings.
3. Cleaning and protection.
4. Starting of systems and equipment.
5. Demonstration to and instruction to Owner's personnel.
6. Closeout procedures.

a. Exception: Payment procedures.

1.3 REFERENCES

A. Abbreviations and Acronyms: AHJs = Authorities having jurisdiction.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Division of the Work: For convenience, this Project Manual has been arranged in sections, but such segregation shall not be considered as limiting the Work required by any Trade. The division of the Work within the Contract shall be the responsibility of the Single Prime Contractor.

a. Exception: Where specifically directed otherwise in the Contract Documents.

2. In the case where the Work of two Trades interfere with each other, and a deviation from the design is required, neither portion of the Work shall proceed

until the Engineer and Owner have been notified of the conflict and has rendered a decision as to what changes should be made.

3. Coordination Meetings:

    a. The Single Prime Contractor shall arrange to have foremen – or other authorized representatives of those firms currently engaged on the Project – meet with the Owner and Engineer at the Site for the purpose of:

        1) Coordinating and scheduling the Work.
        2) Coordinating submittals.
        3) Coordinating the Work of the various Trades.
        4) Ensuring an efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

    b. Such meetings shall be held at times determined by the, during regular working hours.

4. Notify affected utility companies and comply with their requirements. Coordinate the Work of the various Trades having interdependent responsibilities for installing, connecting to, and placing equipment in service.
5. Coordinate space requirements, supports, and installation of electrical work that are indicated diagrammatically on the Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable. Utilize spaces efficiently to maximize accessibility for:

    a. Other installations.
    b. Maintenance.
    c. Repairs.

B. Pre-Installation Meetings: When required in individual sections of the Project Manual, convene a pre-installation meeting at the Site prior to commencing the Work of that specific section.

1. Require attendance of parties directly affecting – or affected by – the Work of that specific section.
2. Notify the Engineer and Owner two (2) days in advance of the proposed date of the meeting.
3. Prepare an agenda and preside at the meeting:

    a. Review conditions of:

        1) Examination.
        2) Preparation.
        3) Installation procedures.

b. Review coordination with related work.

4. Record minutes and distribute copies within two days after meeting to participants, with two copies to the Engineer, Owner, participants, and those affected by decisions made.

1.5 SUBMITTALS

A. Closeout Submittals (Record Documentation): Accurately record actual locations of capped and active utilities.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements;

1. The respective Contractor shall receive written approval(s) from the governing AHJs and furnish the Engineer with a certified copy of such approval if requested.
2. In the event that instructions of the governing AHJs are in conflict with the Contract Documents for this Project, the Contractor shall so advise the and receive new instructions from the Engineer Any changes involving a greater or lesser amount of work shall be the subject of a contract adjustment as set forth elsewhere in this Project Manual.

B. Qualifications:

1. For field engineering, employ a professional engineer of the discipline required for specific service on the Project, licensed in the state of Ohio.

1.7 FIELD CONDITIONS

A. Contractor and each Subcontractor is charged with the protection of the Work and property. Contractor shall erect and maintain barricades, fences, lights, and other safety protective measures at excavations and other hazardous areas for the protection of the public.

B. Contractor and each Subcontractor shall observe the Owner's traffic regulations and not place, store, nor park any vehicle or materials in streets or passageways that might interfere with operations simultaneously in progress.

C. Ventilate enclosed areas to:

1. Assist cure of materials
2. Dissipate humidity
3. Prevent accumulation of the following:

a. Dust
b. Fumes
c. Vapors
d. Gases

D. Dust Control: Execute the Work by methods designed to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into the atmosphere.

1.8 GUARANTEE

A. Contractor Guarantee: Upon completion of the Work under Contract, and before final payment is made, Contractor shall deliver his written guarantee made out to the Owner, guaranteeing the materials, equipment, appliances, and workmanship, for a period of one year from the date of Substantial Completion.

1. Exceptions where otherwise specified in individual sections of this Project Manual: Longer periods will apply.

B. Subcontractor Guarantees: In addition to the Contractor's guarantee, the Contractor shall obtain and deliver each respective Subcontractor's or Sub-Subcontractor's guarantee as requested in individual sections of this Project Manual, covering the materials and workmanship incorporated into the Work of this Contract.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Examine and verify specific conditions described in individual sections of the Project Manual. Verify that the existing conditions and substrate surfaces at the Project area are capable of structural support or are acceptable for subsequent work being applied or attached.

a. Before starting the Work – and from time-to-time as the Work progresses – Contractor shall examine the Work installed by others, insofar as it applies to the Work of Contractor, and shall promptly notify the if any conditions exist that will prevent Contractor from achieving satisfactory results in Contractor's Work.

b. Should Contractor start the Work without such notification, it shall place upon Contractor the responsibility for replacing any of the Work that might be required to be removed in order to correct such faults.

2. Verify that utility services:

   a. Are available.
   b. Of correct characteristics.
   c. In the correct locations.

3. Contractor shall be responsible for the correct layout of their respective portion of the Work and shall make adjustments necessary to fit fixed parts.

   a. Contractor shall verify the measurements of their respective portion of the Work.
   b. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
   c. No compensation will be allowed for differences between dimensions indicated on the Drawings and actual dimensions.
   d. Any such discrepancies shall be submitted to the Engineer for consideration.
   e. Any other discrepancies, errors, or omissions discovered in the Contract Documents by the Contractor or Subcontractors shall be brought to the attention of the Engineer before proceeding with related work; otherwise, the correction of such items shall be the responsibility of the Contractor.
   f. Do not proceed with portions of the Work affected by the discrepancy until the Engineer has rendered a decision.

4. The start of work will be interpreted as acceptance of existing conditions.

3.2 PREPARATION

A. Laying Out the Work:

1. Protect survey control points prior to starting work in the Project area. Preserve permanent reference points during construction.
2. Promptly report to the Engineer the loss or destruction of a reference point or relocation required because of changes in grade or other reason.
3. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the Engineer.
4. Utilize recognized engineering survey practices.
5. Establish elevations, lines and levels.

3.3 INSTALLATION

A. Install products:

1. As specified in individual sections of the Project Manual.
2. Per the respective manufacturer's instructions and recommendations.
3. To avoid waste due to the necessity for replacement.

B. Make vertical elements plumb and horizontal elements level.

1. Exception: Where otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines.

1. Exception: Where otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Non-Conforming Work: The Engineer and Owner have the right to reject defective material and workmanship and require correction.

1. Rejected material shall be promptly segregated and removed from the Project Area and satisfactorily replaced with proper materials without additional cost to the Owner.
2. Rejected workmanship shall be satisfactorily corrected within ten working days upon written notice from either the Engineer and/or Owner.
3. If the Contractor fails to proceed at once with correction of defective material or workmanship, the Owner may – by Contract or otherwise – have defects remedied, or rejected materials removed from the Site, charging cost of same against any monies that might be due to the respective Contractor, without prejudice to any other rights or remedies of the Owner.

3.5 SYSTEMS STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for:

1. Proper control sequence.
2. Conditions that might cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the respective Equipment or System Manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under the supervision of the applicable Contractor's personnel and the respective manufacturer's representative per the respective manufacturer's instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.6 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.7 CLEANING

A. Progress Cleaning:

1. Maintain the Project area in a clean and orderly condition. Maintain areas free of:

   a. Waste materials.
   b. Debris.
   c. Rubbish.

2. Collect and remove waste materials, debris, and trash/rubbish from the Project area weekly and dispose of away from the Project area. Do not burn or bury materials at the Project area.

B. Final Cleaning:

1. Clean debris from the Project area:
2. Clean the Site:

   a. Sweep paved areas.
   b. Rake-clean landscaped surfaces.

3. Remove waste, surplus materials, trash/rubbish, and construction facilities from the Site. Dispose of in a legal manner. Do not burn or bury.

3.8 CLOSEOUT ACTIVITIES

A. Demonstration:

1. For each item of equipment, demonstrate the following at a scheduled time, at the equipment location.

a. Start-up.
b. Operation.
c. Control.
d. Adjustment.
e. Trouble-shooting.
f. Servicing.
g. Maintenance.
h. Shutdown.

2. For equipment or systems requiring seasonal operation, perform demonstration for other season within two (2) weeks.
3. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of the Owner's personnel.

B. Other Closeout Procedures:

1. Make submittals that are required by governing or other AHJs.

a. Provide copies to the Engineer and the Owner.

2. Notify the Engineer and Owner when the Work is considered ready for Substantial Completion.
3. Submit written certification that:

a. The Contract Documents have been reviewed.
b. The Work has been inspected.
c. The Work is complete per the Contract Documents.
d. The Work is ready for review by the Engineer.

4. Correct items of the Work listed in executed Certificates of Substantial Completion.
5. Notify the Engineer when the Work is considered finally complete.
6. Complete items of the Work identified by the final inspection by the Engineer.

3.9 PROTECTION

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual sections of the Project Manual.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

END OF SECTION 017000

Section 220500 - Common Work Results for Plumbing

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. General Plumbing Requirements specifically applicable to all Division 22 Sections.
2. Piping materials and installation instructions common to most piping systems.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Plumbing Demolition (when indicated on the drawings).
9. Equipment installation requirements common to equipment sections.
10. Concrete bases.
11. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene monomer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 REFERENCES AND STANDARDS:

A. The latest editions of the following are hereby included in and made a part of Division 22:

1.	NFPA	National Fire Protection Association
2.	UL	Underwriters' Laboratories, Inc.
3.	NEMA	National Electrical Manufacturer's Association
4.	NEC	National Electric Code
5.	ASME	American Society of Mechanical Engineers
6.	AWS	American Welding Society
7.	ANSI	American National Standards Institute
8.	AGA	American Gas Association
9.	HI	Hydronics Institute
10.	OSHA	Occupational Safety and Health Act
11.	AWWA	American Water Works Association
12.	CISPI	Cast Iron Soil Pipe Institute

1.5 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code for Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Contractor shall coordinate the work of the different trades so that interference between piping, equipment, structural, and electrical work will be avoided. All necessary offsets in piping and ductwork, and all fittings, and other components, required to install the work properly shall be furnished complete in place at no additional cost.

B. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the Contractors and Subcontractors will apply:

1. Make-up water piping connections shall be provided by the Plumbing Contractor to within five (5) feet of the required point of connection to the equipment and there terminated with a shut-off valve. Each trade shall make the final connection to the equipment it installs.
2. Ceiling access panels will be installed by the General Contractor at locations determined by the Plumbing Contractor.
3. The Plumbing Contractor or subcontractor shall install all roughing-in pertaining to his trade for each item of equipment furnished under another Section of the Specifications or by the Owner.
4. The Plumbing Contractor shall make final connections of equipment to rough-ins.

1.9 TESTING AND REPAIR

A. All piping and ductwork systems shall be thoroughly cleaned and flushed prior to final testing.

B. Pressure testing shall be completed for the following piping systems:

1. Domestic water, sanitary and vent, storm and gas piping systems, and other systems as noted on the plans.

C. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

D. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.10 FINAL COMPLETION

A. All work shall be cleaned prior to issuance of Substantial Completion.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.

C. Deliver any equipment as required by this Specification to Owner and obtained signed receipts of delivery.

D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.

E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.

F. Contractor shall submit written certificates warranting each item of equipment.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS:

A. All equipment and materials shall be furnished in strict accordance with the equipment named and according to Specification requirements. Each bid shall be based upon one of the materials or manufacturers specified.

B. Equipment and materials specified shall be considered to have prior approval, but submittal for approval is required. Furnish construction drawings to other Contractors when required to coordinate construction.

C. Where multiple manufacturers are named the drawings and specifications are based on the requirements and layouts for the equipment of the first named manufacturer. Any change required by the use of other named manufacturers such as revisions to foundations, bases, piping, controls, wiring, openings, and appurtenances shall be made by the Contractor at no additional cost to the Owner.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, 95/5 lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and non-corrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

   a. Link-Seal.
   b. Metraflex Co.
   c. Fernco

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

D. One-Piece, Cast-Brass Type: With set screw and polished chrome-plated finish

E. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

F. One-Piece, Floor-Plate Type: Cast-iron floor plate.

G. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION (When indicated on the drawings)

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove Plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Piping shall not project beyond walls or steel lines nor shall it hang below slabs more than is absolutely necessary. Particular attention shall be paid to the required clearances.

F. Offset piping where required to avoid interference with other work, to provide greater headroom or clearance, or to conceal pipe more readily. Offsets shall be properly drained or trapped where necessary.

G. Provide swing joints and expansion bends wherever required to allow the piping to expand without undue stress to connections or equipment.

H. Exposed piping around fixtures or in other conspicuous places shall not show tool marks at fittings.

I. Isolate pipe from the building construction to prevent transmission of vibration to the structure and to eliminate noise.

J. Install piping such that any equipment connected to piping may be removed by disconnecting two (2) flanges or unions and removing only one or two pipe sections. All equipment shall have bolted or screwed flanges or unions at pipe connections.

K. Install fittings for changes in direction and branch connections. T-drill system for mechanically formed tee connections and couplings, and Victaulic hole cut piping system are not allowed.

L. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.

M. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

N. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

O. Install piping to permit valve servicing.

P. Install piping at indicated slopes.

Q. Install piping free of sags and bends.

R. Install piping to allow application of insulation.

S. Eccentric reducing couplings shall be provided in all cases where air or water pockets would otherwise occur due to a reduction in pipe size.

T. Cap and plug all openings in pipes during construction with suitable metal plugs or cap to keep out dirt and rubbish until equipment is connected.

U. Install drains, consisting of a tee fitting, NPS 3/4 full port-ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

V. Select system components with pressure rating equal to or greater than system operating pressure.

W. Install escutcheons for penetrations of walls, ceilings, and floors

X. All pipes extending through the roof shall be flashed with six pound lead flashing extending 6 inches beyond the pipe, welded to a lead sleeve extended up around the vent pipes, and rolled over into the pipe.

Y. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Sleeves placed in floors shall be flush with the ceiling and shall have planed, square ends, extending 2 inches above the finished floor, unless otherwise specified or detailed.
2. Where sleeves pass through reinforced concrete floors, they shall be properly set in position before the concrete is poured, and shall be maintained in position by the Contractor until the concrete is set.
3. Sleeves placed in concrete beams shall be flush with the side of the beam and large enough to accommodate the bare pipe only. All other sleeves shall be of adequate size to accommodate pipe insulation undiminished in size.
4. Pipes passing through below grade perimeter walls or slabs on grade shall have the space between the pipe and sleeve sealed watertight.
5. Pipes passing through above grade floor slabs and masonry walls shall have the space between the pipe or insulation and the sleeve packed with non-asbestos wicking or other suitable, approved, non-combustible material.
6. Pipes passing through walls of Mechanical Equipment Rooms shall be made gas-tight by caulking the space between the pipe and sleeve with a fiber saturated with an approved type of plastic material.
7. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

Z. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

AA. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to

allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

BB. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

CC. Verify final equipment locations for roughing-in.

DD. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Nonpressure Piping: Join according to ASTM D 2855.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings to connect piping materials of dissimilar metals.

B. Unions shall be used in preference to couplings where their use will facilitate dismantling the pipe for maintenance.

C. Pipe sizes indicated shall be carried full size to equipment served. Any change of size to match equipment connection shall be made within one foot of the equipment. At temperature control valves with sizes smaller than connected lines, reduction shall be made immediately adjacent to valves.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install Plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Install dowel rods to connect concrete base to concrete floor.
2. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section “Cast-in-Place Concrete”

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor Plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

A. Mix and install grout for Plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 220500

Section 220523 - General-Duty Valves for Plumbing Piping

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze butterfly valves
5. Bronze swing check valves.
6. Iron swing check valves.
7. Iron swing check valves with closure control.
8. Bronze gate valves.
9. Iron gate valves.
10. Bronze globe valves.
11. Iron globe valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.3 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.4 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

C. To assure uniformity and compatibility, all grooved end valves and adjoining couplings shall be supplied by the same manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

E. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.
4. Grooved: With grooves according to ANSI/AWWA C606.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Milwaukee Valve Company.
   d. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Ductile-Iron Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Center Line.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. DeZurik Water Controls.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Nickel-plated ductile iron.

2.4 BRONZE BUTTERFLY VALVE

A. 300 CWP, Bronze Butterfly Valves with Elastomer-Coated Ductile Iron Disc:

1. Manufacturers Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

a. Victaulic Series 608
b. Anvil - Gruvlok

c. Tyco - Shurjoint

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 300 psig.
c. Body Design: Copper-tube dimensions; suitable for bubble-tight shutoff, bi-directional dead-end service at full rated pressure without use of downstream flange.
d. Body Material: Bronze CDA-836.
e. Seat: Double seal EPDM disc coating
f. Stem: Integrally cast steel.
g. Disc: EPDM-coated ductile iron

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.6 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.

b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Powell Valves.

2. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.

2.7 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:

1. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.
h. Closure Control: Factory-installed, exterior lever and spring.

2.8 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Powell Valves.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

2.9 IRON GATE VALVES

A. Class 125, OS&Y, Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Powell Valves.

2. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

2.10 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.

e. Powell Valves.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

2.11 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Powell Valves.

2. Description:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

F. Install grooved end valves in accordance with the manufacturer's guidelines and recommendations. A representative shall provide on-site training for contractor's field personnel in the installation of grooved end valves. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Throttling Service: Globe, ball, or butterfly valves.
3. Pump-Discharge Check Valves:

    a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
    b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring.
    c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.4 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.

2. Bronze Angle Valves: Class 125, bronze disc.
3. Ball Valves: Two piece, full port, brass with bronze trim.
4. Bronze Swing Check Valves: Class 125, bronze disc.
5. Bronze Gate Valves: Class 125, NRS.
6. Bronze Globe Valves: Class 125, bronze disc.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

2. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, ductile-iron disc.

3. Iron Swing Check Valves: Class 125, metal seats.
4. Iron Swing Check Valves with Closure Control: Class 125, lever and spring.
5. Iron Gate Valves: Class 125, OS&Y.
6. Iron Globe Valves: Class 125.
7. Bronze, Grooved-End Butterfly Valves: 300 CWP, EPDM coated-ductile iron double seal disc.

END OF SECTION 220523

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Section 220529 - Hangers and Supports for Plumbing

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.
6. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 SYSTEM DESCRIPTION

A. Except as otherwise indicated, provide factory fabricated pipe hangers and supports complying with MSS SP-58, or one of the following types listed, selected by installer to suit piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service.

1.5 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including installation instructions, shop drawings, and maintenance data for each type of support and anchor.

1.7 QUALITY ASSURANCE

A. Selection and application of pipe hangers and supports shall conform to applicable codes and standards listed in Division 01, except as otherwise modified and supplemented herein:

1. ASME/ANSI B31.1 and B31.9
2. MSS SP-58
3. MSS SP-69
4. MSS SP-89

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Clevis.
2. Fee and Mason.
3. Anvil.
4. PHD Manufacturing, Inc.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Powder-Actuated Fasteners: Not allowed

2.6 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation: Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Hanger rods shall not be bent. Swivel hangers shall be used where required.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts

before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Holes shall not be drilled or punched in beams and supporting members. Do not support piping from roof deck, other piping, ducts or equipment.

M. Hangers and supports shall also be provided at every change of direction and within 1' of any pipe fittings and valves.

N. Pipe hangers in fan rooms and in mechanical equipment rooms shall be provided with suitable vibration isolation units to eliminate noise transmission between the piping and the building structure.

O. Anchors, Guides and Restraints: Anchors, guides and restraints shall be provided wherever necessary to support risers, to maintain pipe in position, and to properly distribute expansion.

P. Supplemental Framing: Supplemental framing, angles, channels or beams, shall be provided where the anchor locations do not align with the building structure or where the intended loads exceed the structural framing maximum load carrying capacity.

Q. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

R. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

S. Plastic Pipe Hanger Installation:

1. Rigid plastic piping shall normally be supported by the same type of hangers used with steel pipe. In pressure application, hangers shall be provided with pads or cushions on the bearing surfaces.
2. Flexible plastic tubing shall be supported continuously by metal angles or channels with special hangers.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Use of "C" clamps and beam clamps of “C” pattern and any modifications thereof are prohibited for all sizes 3” and greater.

K. “C” Clamps used for sizes 2-1/2" and under must be ductile iron with locknut; FM approved.

L. “C” Clamps used for sizes 1-1/2” through 2-1/2" must also be installed with Beam Clamp Retaining Straps with a minimum of 1" of strap to be bent over the beam side of the flange opposite the side the beam clamp is mounted on.

M. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Adjustable, Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 4.
3. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
4. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
5. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
6. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.

7. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

N. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

O. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

P. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles. Use only when it is not possible to use center loading beam clamps. Subject to prior approval by the A/E.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
5. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
6. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

Q. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

R. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

S. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

T. Use mechanical-expansion anchors instead of building attachments where required in solid concrete construction.

U. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

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Section 220700 - Plumbing Insulation

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:

a. Flexible elastomeric.
b. Mineral fiber.
c. Polyolefin.

2. Insulating cements.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Factory-applied jackets.
7. Field-applied fabric-reinforcing mesh.
8. Field-applied jackets.
9. Tapes.
10. Securements.
11. Corner angles.

B. Related Sections include the following:

1. Division 21 Section "Fire-Suppression Systems Insulation."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.

4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Johns Manville; Micro-Lok.
   b. Knauf Insulation; 1000 Pipe Insulation.
   c. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Armacell LLC; Tubolit.
   b. Nomaco Inc.; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.
   c. RBX Corporation; Therma-cell.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Insulco, Division of MFS, Inc.; SmoothKote.
   b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
   c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Aeroflex USA Inc.; Aeroseal.
   b. Armacell LCC; 520 Adhesive.
   c. Foster Products Corporation, H. B. Fuller Company; 85-75.
   d. RBX Corporation; Rubatex Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Products, Division of ITW; CP-82.
   b. Foster Products Corporation, H. B. Fuller Company; 85-20.
   c. ITW TACC, Division of Illinois Tool Works; S-90/80.
   d. Marathon Industries, Inc.; 225.
   e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Products, Division of ITW; CP-82.
   b. Foster Products Corporation, H. B. Fuller Company; 85-20.
   c. ITW TACC, Division of Illinois Tool Works; S-90/80.
   d. Marathon Industries, Inc.; 225.
   e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Dow Chemical Company (The); 739, Dow Silicone.
   b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Speedline Vinyl Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-10.
b. Foster Products Corporation, H. B. Fuller Company; 35-00.
c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
d. Marathon Industries, Inc.; 550.
e. Mon-Eco Industries, Inc.; 55-50.

2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 200 deg F.
4. Solids Content: 63 percent by volume and 73 percent by weight.

5. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Products, Division of ITW; CP-76.
   b. Foster Products Corporation, H. B. Fuller Company; 30-45.
   c. Marathon Industries, Inc.; 405.
   d. Mon-Eco Industries, Inc.; 44-05.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Products, Division of ITW; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.

   a. Products: Subject to compliance with requirements, provide one of the following:

1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

5. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. inch, in a Leno weave, for equipment and pipe.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Products Corporation, H. B. Fuller Company; Mast-A-Fab.
b. Vimasco Corporation; Elastafab 894.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
b. Compac Corp.; 110 and 111.
c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.

2. Width: 2 inches.

3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. PVDC Tape: White vapor-retarder PVDC tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company (The); Saran 540 Vapor Retarder Tape.

2. Width: 3 inches.
3. Film Thickness: 4 mils.
4. Adhesive Thickness: 1.5 mils.
5. Elongation at Break: 145 percent.
6. Tensile Strength: 55 lbf/inch in width.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe

insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 POLYOLEFIN INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

D. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presized jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch-circumference limit allows for 2-inch- overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.9 FINISHES

A. Equipment and Pipe Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, locations of welded strainers, locations of threaded valves, and locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold and Non-potable Cold Water: Insulation shall be one of the following:

1. Flexible Elastomeric: 1/2 inch thick for pipe sizes less than 1-1/2 inches, 1 inch thick for pipe sizes 2 inches and greater
2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick for pipe sizes less than 1-1/2 inches, 1 inch thick for pipe sizes 2 inches and greater
3. Polyolefin: 1/2 inch thick for pipe sizes less than 1-1/2 inches, 1 inch thick for pipe sizes 2 inches and greater

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops at lavatories shall be insulated and finished with Truebro Model No. 102 "Lav-Guard" or Brocar "Trap-Wrap" white insulation kit.

END OF SECTION 220700

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Section 221119 - Domestic Water Piping Specialties

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Balancing valves.
2. Strainers.
3. Drain valves.
4. Trap-seal primer valves.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.

PART 2 - PRODUCTS

2.1 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Crane Co
   b. Hammond Valve.
   c. Milwaukee Valve Company.
   d. NIBCO Inc.

2. Standard: MSS SP-110 for standard-port, two-piece ball valves.
3. Size: NPS 3/4.
4. Ball: Chrome-plated brass.
5. Seats and Seals: Replaceable.
6. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.2 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. PPP Inc.
   b. Smith, Jay R. Mfg. Co.
   c. Watts Industries

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. TRAP-SEAL PRIMER SYSTEMS

1. Electronic Trap-Seal Primer Systems:

   a. Standard: ASSE 1044.
   b. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.

c. Cabinet: Surface-mounted NEMA stainless steel box.
d. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

1) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

e. Vacuum Breaker: ASSE 1001.
f. Number Outlets: Varies.
g. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow preventers.

C. Install water pressure regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated water mixing valve stations in accordance with manufacturers instructions.

F. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.

G. Install water hammer arresters in water piping according to PDI-WH 201.

H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

I. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

J. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each reduced-pressure-principle backflow preventer and double-check backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.3 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 221119

Section 221120 - Non-potable Water Piping

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Whirlpool pipe and fittings.
2. Recycled Rainwater pipe and fittings from storage tank to equipment and fixtures in the building.
3. Specialty valves.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 and 61 for non-potable water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 CPVC PIPE AND FITTINGS

A. CPVC Pipe: ASTM D 2846/D 2846M and D1784. Pipe 2" and smaller to be purple in color and labeled "Caution: Non-Potable Water. Do Not Drink".

1. Fittings: Socket type either tan or purple in color.

2.3 PVC PIPE AND FITTINGS

A. PVC Pipe: ASTM D 1785 Schedule 40 and Schedule 80.

1. PVC Socket Fittings: ASTM D 2466 Schedule 40 and ASTM D 2467 for Schedule 80.
2. PVC Screwed Fittings: ASDTM D 2464 Schedule 80.

2.4 PIPING JOINING MATERIALS

A. Solvent Cements for Joining CPVC Piping: ASTM F 493.

1. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.5 SPECIALTY VALVES

A. CPVC Union Ball Valves:

1. Description:

a. Standard: MSS SP-122.
b. Pressure Rating: 150 psig at 73 deg F.
c. Body Material: CPVC.
d. Body Design: Union type.

e. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
f. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
g. Ball: CPVC; full port.
h. Seals: PTFE or EPDM-rubber O-rings.
i. Handle: Tee shaped.

B. PVC Union Ball Valves:

1. Description:

a. Standard: MSS SP-122.
b. Pressure Rating: 150 psig 73 deg F.
c. Body Material: PVC.
d. Body Design: Union type.
e. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
f. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
g. Ball: PVC; full port.
h. Seals: PTFE or EPDM-rubber O-rings.
i. Handle: Tee shaped.

C. PVC Butterfly Valves:

1. Description:

a. Pressure Rating: 150 psig at 73 deg F.
b. Body Material: PVC.
c. Body Design: Lug or wafer type.
d. Seat: EPDM rubber.
e. Seals: PTFE or EPDM-rubber O-rings.
f. Disc: PVC.
g. Stem: Stainless steel.
h. Handle: Lever.

D. CPVC Ball Check Valves:

1. Description:

a. Pressure Rating: 150 psig at 73 deg F.
b. Body Material: CPVC.
c. Body Design: Union-type ball check.
d. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
e. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
f. Ball: CPVC.
g. Seals: EPDM- or FKM-rubber O-rings.

E. PVC Ball Check Valves:

1. Description:

    a. Pressure Rating: 150 psig at 73 deg F.
    b. Body Material: PVC.
    c. Body Design: Union-type ball check.
    d. End Connections for Valves NPS 2 and Smaller: Detachable, socket.
    e. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
    f. Ball: PVC.
    g. Seals: EPDM- or FKM-rubber O-rings.

F. CPVC Gate Valves:

1. Description:

    a. Pressure Rating: 150 psig at 73 deg F.
    b. Body Material: CPVC.
    c. Body Design: Nonrising stem.
    d. End Connections for Valves NPS 2 and Smaller: Socket.
    e. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
    f. Gate and Stem: Plastic.
    g. Seals: EPDM rubber.
    h. Handle: Wheel.

G. PVC Gate Valves:

1. Description:

    a. Pressure Rating: 150 psig at 73 deg F.
    b. Body Material: PVC.
    c. Body Design: Nonrising stem.
    d. End Connections for Valves NPS 2 and Smaller: Socket.
    e. End Connections for Valves NPS 2-1/2 to NPS 4: Flanged.
    f. Gate and Stem: Plastic.
    g. Seals: EPDM rubber.
    h. Handle: Wheel.

2.6 TRANSITION FITTINGS

A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

B. Sleeve-Type Transition Coupling: AWWA C219.

C. Plastic-to-Metal Transition Fittings:

1. Description: CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.

D. Plastic-to-Metal Transition Unions:

E. Description: CPVC or PVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping level and plumb.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install piping to permit valve servicing.

H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install unions at final connection to each piece of equipment, machine, and specialty.

L. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.

M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are damaged.

D. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

E. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2” and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

1. PVC Valves: PVC Acceptable for clear water piping (matching the existing valves and see thru piping material currently installed to monitor the existing standpipe) pool level monitor piping for the Auto-Fill Sensors.

B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Aboveground Piping NPS 2 and Smaller: Plastic-to-metal transition fittings.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

3. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.

E. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

F. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.

G. Install hangers for vertical PEX piping every 48 inches.

H. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6: 48 inches with 3/4-inch rod.

I. Install supports for vertical PVC piping every 48 inches.

J. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping with system operating pressure.

C. Label Recycled Rainwater as "Non-potable Do Not Drink" where not labeled by manufacturer.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill system. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 CLEANING

A. Clean and disinfect Recycled Rainwater piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:

      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of Recycle Rainwater piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Underground Recycled Rainwater piping between storage tank and building shall be the following:

1. Schedule 80 PVC with socket weld fittings.

D. Aboveground Recycled Rainwater piping, NPS 2 and smaller, shall be the following:

1. CPVC purple in color with socket weld fittings. Piping to be labeled “Caution: Non-Potable Water. Do Not Drink”.

E. Aboveground Recycled Rainwater piping, NPS 3, shall be the following:

1. CPVC with socket weld fittings. Piping to be labeled after insulating with “Caution: Non-Potable Water. Do Not Drink”.

F. Whirlpool water piping shall be the following:

1. Schedule 80 PVC with Schedule 80 screwed PVC fittings.

3.11 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of water flow to and from equipment.

END OF SECTION 221120

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Section 221316 – Sanitary waste and Vent Piping

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to area outside of scope for facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owners representative no fewer than two (2) days in advance of proposed interruption of sanitary waste service, if any.
2. Do not proceed with interruption of sanitary waste service Owners representative written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class(es).

B. Gaskets: ASTM C 564, rubber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

1. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.

2.4 GALVANIZED-STEEL PIPE AND FITTINGS

1. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.

2.5 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Push-on-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

2.6 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B 88, Type L and Type M (ASTM B 88M, Type B and Type C), water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.7 ABS PIPE AND FITTINGS

A. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40.

B. Cellular-Core ABS Pipe: ASTM F 628, Schedule 40.

C. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.

D. Solvent Cement: ASTM D 2235.

1. ABS solvent cement shall have a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.8 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.9 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:
   a. Sleeve Materials:
      1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
4. Shielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C 1460.
   b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
   a. Description:
      1) Standard: ASSE 1079.
      2) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C) 150 psig (1035 kPa) 250 psig (1725 kPa).

3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Nipples:

a. Description:

1) Standard: IAPMO PS 66
2) Electroplated steel nipple.
3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C)
4) End Connections: Male threaded or grooved.
5) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back

to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1% slope, downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Drainage Piping: 2% slope, downward in direction of flow.
3. Vent Piping: 1% slope, down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

N. Install steel piping according to applicable plumbing code.

O. Install stainless-steel piping according to ASME A112.3.1 and applicable plumbing code.

P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

Q. Install aboveground ABS piping according to ASTM D 2661.

R. Install aboveground PVC piping according to ASTM D 2665.

S. Install underground PVC piping according to ASTM D 2321.

T. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

U. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

V. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."

1. Install encasement on piping according to ASTM A 674 or AWWA C105/A 21.5.

W. Install force mains at elevations indicated.

X. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

Y. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Z. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

AA. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

BB. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

F. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage piping nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:

   a. NPS 1-1/2 (DN 40) and Smaller: Fitting-type transition couplings.
   b. NPS 2 (DN 50) and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 (DN 50) 2” and Smaller: Use dielectric nipples and unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100) Use dielectric nipples and unions.

3.4 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523.12 "Ball Valves for Plumbing Piping, Section 220523.14 and "Check Valves for Plumbing Piping,"

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install full-port ball valve for piping NPS 2 (DN 50) and smaller.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install pipe hangers for horizontal piping in noncorrosive environments.
2. Install pipe hangers for horizontal piping in corrosive environments.
3. Install pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 and NPS 8 (DN 150 and DN 200): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
5. NPS 10 and NPS 12 (DN 250 and DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.
6. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

G. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
5. NPS 3 (DN 80): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.
6. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.
7. NPS 6 and NPS 8 (DN 150 and DN 200): 12 feet (3.7 m) with 3/4-inch (19-mm) rod.
8. NPS 10 and NPS 12 (DN 250 and DN 300): 12 feet (3.7 m) with 7/8-inch (22-mm) rod.

I. Install supports for vertical steel piping every 15 feet (4.5 m).

J. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 (DN 50): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 96 inches (2400 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 (DN 100): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
4. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.

K. Install supports for vertical stainless-steel piping every 10 feet (3 m).

L. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
3. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
4. NPS 3 and NPS 5 (DN 80 and DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.
5. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.
6. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.

M. Install supports for vertical copper tubing every 10 feet (3 m).

N. Install hangers for piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 and NPS 8 (DN 150 and DN 200): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 10 and NPS 12 (DN 250 and DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

O. Install supports for exposed vertical piping every 48 inches (1200 mm).

P. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

5. Comply with requirements for Cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.10 PIPING SCHEDULE

A. Aboveground, vent piping NPS 4 (DN 100) 4” and smaller shall be PVC the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Galvanized-steel pipe, drainage fittings, and threaded joints.
4. Stainless-steel pipe and fittings gaskets, and gasketed joints.
5. Copper DWV tube, copper drainage fittings, and soldered joints.

    a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2 (DN 65 and DN 90): Hard copper tube, Type M (Type C); copper pressure fittings; and soldered joints.

6. ABS pipe, ABS socket fittings, and solvent-cemented joints.
7. PVC pipe, PVC socket fittings, and solvent-cemented joints.
8. Dissimilar Pipe-Material Couplings: nonpressure transition couplings.

B. Aboveground, vent piping NPS 5 (DN 125) 3” shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, hubless-piping couplings; and coupled joints.
3. Galvanized-steel pipe, drainage fittings, and threaded joints.
4. PVC pipe, PVC socket fittings, and solvent-cemented joints.
5. Dissimilar Pipe-Material Couplings: nonpressure transition couplings.

C. Underground, soil, waste, and vent piping NPS 4 (DN 100) 4” or smaller shall be any of the following:

1. Service class, cast-iron soil piping &joints joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI or cast iron hubless-piping couplings; and coupled joints.
3. Stainless-steel pipe and fittings, gaskets, and gasketed joints.
4. ABS pipe, ABS socket fittings, and solvent-cemented joints.
5. PVC pipe, PVC socket fittings, and solvent-cemented joints.
6. Dissimilar Pipe-Material Couplings & nonpressure transition couplings.

D. Underground, soil and waste piping NPS 5 (DN 125) 4” and larger shall be any of the following:

1. Service class, cast-iron soil piping.
2. Hubless, cast-iron soil pipe and fittings; cast-iron hubless-piping couplings; coupled joints.
3. PVC pipe; PVC socket fittings; and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings and nonpressure transition couplings.

END OF SECTION 221316

Section 224000 - Plumbing Fixtures

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Protective shielding guards.
2. Fixture supports.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

C. FRP: Fiberglass-reinforced plastic.

D. PMMA: Polymethyl methacrylate (acrylic) plastic.

E. PVC: Polyvinyl chloride plastic.

F. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.

G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Pipe Threads: ASME B1.20.1..
2. Supply Fittings: ASME A112.18.1.
3. Brass Waste Fittings: ASME A112.18.2.

H. Comply with the following applicable standards and other requirements specified for shower faucets:

1. Pipe Threads: ASME B1.20.1.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Brass and Copper Supplies: ASME A112.18.1.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Flexible Water Connectors: ASME A112.18.6.
2. Pipe Threads: ASME B1.20.1.
3. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1

A. ADD. ALTERNATE AND BASE BID

1. Description: Refer to schedules and notes on the drawings for latest model number(s).

a. Floor Drain.
b. Trench Drain.
c. Auto-fill sensor.

2.2 FIXTURE SUPPORTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Company
2. Smith, Jay R. Mfg. Co.
3. Tyler Pipe; Wade Div.
4. Zurn Plumbing Products Group; Specification Drainage Operation.
5. ACO
6. NDS
7. Jandy Levolor

a. Retain 0475.047 for single hole 0476.028 for 4” centers.

2.3 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install fixtures level and plumb according to roughing-in drawings.

C. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

D. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

E. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

F. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

G. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Escutcheons for Plumbing Piping."

H. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

2.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

2.5 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

C. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

D. Install fresh batteries in sensor-operated mechanisms.

2.6 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000

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Section 260101 - Electrical Demolition

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of electrical items.
2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Extend wiring and conduit as required.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

1. Coordinate with contracting officer, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

A. Schedule of Electrical Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
6. Means of protection for items to remain and items in path of waste removal from building.

B. Inventory: After electrical demolition is complete, submit a list of items that have been removed and salvaged.

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning electrical demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site to comply with:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize electrical demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to electrical demolition area. Conduct electrical demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify contracting officer. Contracting officer will have hazardous materials removed under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Maintain fire-protection facilities in service during demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

B. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

C. When unanticipated electrical elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Contracting Officer. Contractor is responsible for all items, demolition and reinstallation whether shown on the drawings or not shown on the drawings.

3.2 UTILITY SERVICES AND ELECTRICAL SYSTEMS

A. Existing Electrical Services/Systems: Maintain electrical services/systems indicated to remain and protect them against damage during selective demolition operations.

3.3 ELECTRICAL DEMOLITION, GENERAL

A. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.5 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by electrical demolition operations. Return adjacent areas to condition existing before electrical demolition operations began.

END OF SECTION 260101

Section 260500 - Common Work Results for Electrical

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Common requirements for electrical installation.

1.2 SUBMITTALS

A. N/A.

PART 2 - PRODUCTS

2.1 N/A.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with any applicable Owner Required Design Standards.

B. Comply with NECA, NFPA, and OSHA requirements.

C. All work shall be installed in a neat, workmanlike manner in accordance with ANSI/NECA 1 – 2010.

D. All materials and equipment provided under this contract shall be new (except where otherwise noted) and shall be listed, labeled or certified by Underwriters Laboratories, Inc.

E. All equipment of the same type and capacity shall be by the same manufacturer.

F. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

G. During construction the contractor shall at all times maintain electrical utilities of the building without interruption. Should it be necessary to interrupt any electrical service or utility, the contractor shall secure permission in writing from the Owner for such

interruption at least seven days in advance. Any interruption shall be made with minimum amount of inconvenience to the Owner and any shut-down time shall have to be on a premium time basis and such time to be included in the contractor's bid. Arrange to provide and pay for temporary power source if required by project conditions.

H. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounted items.

I. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

J. Working clearance around equipment shall not be less than that specified in the N.E.C. for all voltages specified.

K. The locations of switches, receptacles, lights, motors, etc. outlets shown are approximate. The contractor shall use good judgment in placing the preceding items to eliminate all interference with ducts, piping, etc. The contractor shall check all door swings so that light switches are not located behind doors. Relocate switches as required, with approval from the Design Professional. Owner may direct relocation of outlets before installation, up to five (5) feet from the position indicated on the Drawings, without additional cost.

L. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity. Normal maintenance shall not require the removal of protective guards from adjacent equipment. Install equipment as close as practical to the locations shown on the Drawings.

1. Where the Owner determines that the Contractor has installed equipment not conveniently accessible for operations and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Owner.
2. “Conveniently Accessible” is defined as being capable of being reached without use of ladders, or without climbing or crawling over or under obstacles such as motors, pumps, belt guards, transformers, racks, piping, ductwork, raceways or similar.

M. Right of Way: Give to piping systems installed at a required slope.

N. Firestopping shall be applied to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of the assembly according to Division 07 and 09 Sections.

O. Owner furnished equipment: Equipment furnished by the Owner shall be received, stored, uncrated, protected, and installed by the Contractor with all appurtenances required to place the equipment in operation, ready for use. The Contractor shall be responsible for the equipment as if he had purchased the equipment himself.

END OF SECTION 260500

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Section 260519 - Low Voltage Electrical Power Conductors and Cables

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL and marked for intended use.

B. Comply with ASTM.

C. Comply with UL 44, 83, and 486.

D. Comply with NFPA 70.

E. Comply with NFPA 99.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Include data sheets for the following additional items:

1. Splices and terminations.
2. Pulling compounds.
3. Cable accessories.

C. Field quality-control test reports.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's permission.
3. Owner's Lock-out/Tag-out procedures shall be used with Contractor controlled locks and tags.
4. Comply with NFPA 70E.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable Corporation.
2. Okonite.
3. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70.

1. Aluminum conductors shall not be used under any circumstances.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN, XHHW-2 and SO.

1. Voltage rating: 600 Volts for 480/277V and 208/120V.

D. Multi-conductor Cable type MC and AC: Use of MC cable is not permitted under any circumstances unless specifically approved in writing by the Owner.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burndy, Thomas & Betts.
2. O-Z/Gedney; EGS Electrical Group LLC.
3. 3M; Electrical Products Division.

4. Ilsco.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

1. Aboveground Circuits (No. 10 AWG and smaller):

a. Connectors: Solderless, screw-on, reusable pressure cable type, rated 600 V, 90˚ C, with integral insulation, approved for copper conductors.
b. The integral insulator shall have a skirt to completely cover the stripped wires.
c. The number, size, and combination of conductors, as listed on the manufacturer's packaging, shall be strictly followed.

2. Aboveground Circuits (No. 8 AWG and larger):

a. Cable termination lugs shall be made of high conductivity and corrosion-resistant material, electro-tin plated, listed for use with copper conductors only, rated for 600 V. Lugs shall be color coded by size.
b. Cable termination lugs shall be indent type, long barrel with chamfered entry, 2 – hole, compression type for 250 kcmil and above, 1 – hole for less than 250 kcmil.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Soft annealed Copper stranded, class B compressed.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Minimum Wire Size: #12 awg for power and lighting circuits, #14 awg for control circuits. For 277-volt branch circuits, in the case of “homeruns” over 125 feet in length, no conductor smaller than a #10 awg wire shall be used. For 120-volt branch circuits, in the case of “homeruns” over 75 feet in length, no conductor smaller than a #10 awg wire shall be used; in the case of “homeruns” over 150 feet in length, no conductor smaller than a #8 awg wire shall be used. In all cases, the tap conductor from the J-box in the ceiling to the device may be #12 awg. Each 277-volt or 120-volt phase conductor shall have a neutral conductor of the same size. The sizing of all wire except remote control wire shall be accomplished in the case of both feeder and branch circuits by conforming to the following provisions. Only lighting circuits may share grounding conductors. All lighting circuits with shared grounding conductors shall be #10 awg minimum.

3.2 CONDUCTOR INSULATION AND MULTI-CONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW, or type THHN/THWN up to and including 600 kcmil.

B. Exposed Feeders: Type XHHW for #2 awg and larger, or type THHN/THWN for all sizes up to and including 600 kcmil, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type XHHW for #2 awg and larger, or type THHN/THWN for all sizes up to and including 600 kcmil, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and underground: Type XHHW for #2 awg and larger, or type THHN/THWN for all sizes up to and including 600 kcmil, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Splices in feeder circuits shall be avoided unless necessitated by the length of the run. Locations of all splices shall be approved by the Owner.

B. Conductors may be run parallel from sizes 250 kcmil up to and including 600 kcmil provided all paralleled conductors are of the same size, manufacturer, length and type of insulation.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems" for secondary service, feeders and branch circuits.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Sections.

1. All penetrations shall be under constant visual surveillance until firestopping is applied.
2. Products: Cooper B –Line, 3m, Hilti, Specified Technologies, Inc.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace non-compliant cables or wires and retest as specified above.

END OF SECTION 260519

Section 260526 - Grounding and Bonding for Electrical Systems

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

B. Section includes grounding systems and equipment, plus the following special applications:

1. Underground distribution grounding.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Ground rods.
2. Grounding arrangements and connections for separately derived systems.

B. Field quality-control/test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Instructions for periodic testing and inspection of grounding features at test wells, ground rings, and grounding connections for separately derived systems based on NFPA 70B.

a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
b. Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with all requirements as defined in NFPA 70, Article 680.

C. Comply with UL 467 for grounding and bonding materials and equipment.

D. Comply with NFPA 70.

E. Comply with NFPA 99.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Tinned-copper wire or cable insulated for 600 V with green colored insulation, UL 44 or UL 83 listed, unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solder-less compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank as part of duct-bank installation. Bury detectable warning tape approximately 6 inches (150 mm) above grounding conductors. Warning tape shall comply with Section 260553.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Exothermic welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Exothermic welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

1. Conduit shall not be used as the ground conductor.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Cable trays shall be grounded and bonded in accordance with N.E.C. requirements.

G. Outdoor metallic fences around electrical equipment shall be grounded.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. 1. Where ground conductors are subject to physical damage, install in raceway.

C. Ground Rods: Drive rods until tops are 12 inches (100 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Wet Niche Luminaires: Equipment ground conductor terminals of a junction box or other enclosure in the supply circuit to a wet niche luminaire shall be connected to the equipment grounding terminal of the panelboard. This terminal shall be directly connected to the panel board enclosure as required by NFPA 70, Article 680.24.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

H. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.

1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
3. UFER ground electrode shall be properly supported to insure proper placement while concrete is being poured, the conductor shall be supported every 30”or less and be properly tensioned to prevent sag.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations

of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, submit to Engineer.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

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Section 260533 - Raceways and Boxes for Electrical Systems

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetallic conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetallic wireways and auxiliary gutters.
5. Boxes, floor boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 QUALITY ASSURANCE

A. All products shall be UL labeled for their intended use.

B. Comply with NFPA 70.

C. Comply with NFPA 99.

1.6 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, products of all manufacturers are acceptable provided they have a smooth interior, are UL listed and labeled as defined in NFPA 70 for the intended location and application and are electro-galvanized steel (EMT) or hot dipped galvanized steel inside and out (GRC). Conduit and fittings shall be obtained from the same manufacturer:

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797.

F. FMC: Comply with UL 1; zinc-coated steel.

G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

H. Multi-conductor Cable type MC and AC: Use of MC cable is not permitted under any circumstances unless specifically approved in writing by the Owner.

I. Electrical nonmetallic tubing (ENT or “blue tube’) and liquid-tight flexible nonmetallic conduit (LFNC) are not acceptable for use under any circumstances unless specifically approved in writing by the Owner.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

   a. Material: Steel.
   b. Type: Set Screw – indoors; compression - outdoors.

3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

4. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

K. Joint Compound for IMC, ARC, or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, products of all manufacturers are acceptable provided they are sunlight resistant and UL listed and labeled as defined in NFPA 70 and marked for intended location and application. Conduit and fittings shall be obtained from the same manufacturer.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Adalet.
2. Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. FSR Inc.
5. Hoffman; a Pentair company.
6. Hubbell Incorporated; Killark Division.
7. O-Z/Gedney; a brand of EGS Electrical Group.
8. RACO; a Hubbell Company.
9. Spring City Electrical Manufacturing Company.
10. Thomas & Betts Corporation.
11. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Metal Floor Boxes:

1. Material: Sheet metal, 11 gauge.
2. Type: Flush. Cover with 0.25”square aluminum flange rated for carpet/tile installations. Provide pour pan accessory for on grade installations.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled UL 514A.

G. Nonmetallic Floor Boxes: Nonadjustable, rectangular.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

I. Sheet Metal Pull and Junction Boxes 100 cu. in. and smaller: NEMA OS 1.

J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

M. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC, IMC, or RNC, Type EPC-80-PVC.
2. Concealed Conduit, Aboveground: IMC, EMT, or RNC, Type EPC-40-PVC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried or concrete encased as indicated.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Feeders over 600 V: GRC.
7. Damp or Wet Locations: GRC or IMC.
8. Tunnels: GRC.
9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Mixing different types of conduits indiscriminately in the same system is prohibited.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew (indoors) or compression (outdoors), steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

F. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

G. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

H. Install surface raceways only where indicated on Drawings.

I. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Installation of all new conduits must be minimum 12 inches from ceiling grid except where approved by Owner.

D. Complete raceway installation before starting conductor installation.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum10-foot (3-m) intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.

4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location. Fittings shall be concrete tight.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

U. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
   d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

V. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

3. Use a maximum of 72 inches (1830 mm) of FMC for recessed and semi-recessed luminaires.
4. Final connections to motors or equipment subject to vibration, noise transmission, or movement shall use FMC not exceeding four feet in length.
5. Short lengths of FMC shall be used for final primary and secondary connections to Low Voltage transformers (<600V).

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Y. Do not install boxes back-to-back in walls. Provide minimum 6-inch separation in non-fire-rated walls. Provide minimum 24-inch horizontal separation in acoustic-rated walls.

Z. Boxes shall be secured between two studs. Boxes connected to one stud are not permitted.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

DD. Set metal floor boxes level and flush with finished floor surface.

EE. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Sections and Owner Fire Protection Group.

1. Products: Cooper B –Line, 3M, Hilti, Specified Technologies, Inc.

3.5 IDENTIFICATION

A. Provide permanent nameplates for all pull and junction boxes identifying circuits, voltage, and source.

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

Section 262726 - Wiring Devices

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by UL and marked for intended location and application.

B. Comply with NFPA 70.

C. Comply with NFPA 99.

D. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.7 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: UL listed and labeled as defined in NFPA 70 and marked for intended location and application.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Heavy duty specification grade complying with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 5351 (single), CR5362 (duplex).
b. Hubbell; HBL5351 (single), HBL5352 (duplex).
c. Pass & Seymour; 5361 (single), 5362 (duplex).
d. Leviton; 5351

2.3 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943, Class A, and FS W-C-596.
3. Include correct wiring/trip indicator light.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; VGF20.
b. Hubbell; GFR5352L.
c. Pass & Seymour; 2095.
d. Leviton; 7899-FE

C. Tamper-Resistant GFCI, Duplex Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; GFTR20.
b. Pass & Seymour; 2095TR.
c. Leviton; MX789
d. Cooper;

2.4 RECEPTACLES FOR SPECIAL EQUIPMENT

A. Specialized Receptacles: Comply with NEMA WD 1, NEMA WD 6 for standard configurations and UL 498.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Cooper.
2. Hubbell.
3. Pass & Seymour.
4. Leviton.

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.
3. Material for Unfinished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof-in-use Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For non-metallic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pig-tailing existing conductors are permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. "Daisy-chaining" of receptacles is not permitted.
6. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
7. Use a torque screwdriver when a torque is recommended or required by manufacturer.
8. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
9. Tighten unused terminal screws on the device.
10. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

H. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

I. Devices installed in waiting room, patient toilet, exam rooms, procedure room, and X-ray room shall be Hospital Grade, tamper-resistant design.

3.2 IDENTIFICATION

A. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped or engraved machine printing with white-filled lettering on black field, self adhesive nameplate attached to face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

Section 265100 - Interior Lighting

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.

B. Related Sections:

1. Section 260519 "Low Voltage Electrical Power Conductors and Cables" for wire and cabling.

1.3 SYSTEM DESCRIPTION

A. Catalog numbers indicated in the Luminaire Schedule are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of light bar, driver, finish trim, ceiling type, mounting hardware or special requirements as specified or as required by the particular installations. Provide complete luminaire to correspond with the features, accessories, number of lamps, wattage and/or size specified in the text description of each luminaire type. Additional features, accessories and options specified shall be included.

B. Provide all frames, supplementary support structures, spacers, stems, aligners, auxiliary junction boxes and other hardware as required for a complete and proper installation.

C. Luminaire voltage shall match the voltage of the circuit serving same.

1.4 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. IP: International Protection or Ingress Protection Rating.

D. LED: Light-emitting diode.

E. LER: Luminaire efficacy rating.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting fixture, including lamp, reflector, and housing.

1.5 SUBMITTALS

A. Product Data: For each type of luminaire, arranged in order of luminaire designation. Include data on features, accessories, finishes, and the following:

1. Material and physical description of luminaire including dimensions.
2. Emergency lighting units including battery and charger.
3. Energy-efficiency data.
4. Life, output (lumens, CCT, and CRI), Kelvin temperature, and energy-efficiency data for lamps.
5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each luminaire type. The adjustment factors shall be for light bars, drivers, and accessories identical to those indicated for the luminaire as applied in this Project.

   a. Testing Agency Certified Data: For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer. LM-79 and LM-80 data for solid state lighting.
   b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

6. Photometric data, certified by a qualified independent testing agency, in IESNA format, based on certified results of laboratory tests of each luminaire type, outfitted with lamps, drivers and accessories identical to those indicated for the luminaire as applied in the Project.
7. Low voltage transformers.
8. LED power supplies.
9. Types of LED’s, including manufacturer, wattage, and Color Rendering Index (CRI) and color temperature in degrees Kelvin (K).

B. Shop Drawings shall:

1. Show detail of nonstandard or custom luminaires.
2. Indicate dimensions, weights, method of field assembly, components, features and accessories.
3. For custom luminaires, modified luminaires or linear luminaires mounted in continuous rows, submit scaled drawings prepared by the manufacturer showing

all details of construction, lengths in runs, pendant or power feed locations, accessories, finishes and lists of materials.

4. This Contractor shall provide the manufacturer with accurate field dimensions where required.
5. Include wiring diagrams, power and control wiring.

C. Wiring diagrams shall detail wiring for luminaires and differentiate between manufacturer installed and field installed wiring.

D. Product Certificates shall be signed by manufacturers of luminaires certifying that products comply with requirements.

E. Maintenance Data shall be provided for luminaires and equipment to include in emergency, operation and maintenance manuals specified in specifications section describing Operations and Maintenance Data.

F. Field quality control test reports.

G. Special Warranties specified in the Section.

H. Review of luminaire submittals which indicate voltage, mounting condition, or quantities shall not be considered to be approval of said voltage, mounting condition or quantities. This Contractor shall field verify voltage and actual mounting condition and method.

I. Product samples, complete with housing, trim, specified lamp and 8’ cord with plug shall be submitted if requested.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and luminaires to include in emergency, operation, and maintenance manuals.

1. Provide a list of all arrays and drivers types used on Project; use ANSI and manufacturers' codes.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Glass, Plastic Diffusers and Lenses: 10% or one dozen (whichever is less) of each type and rating installed. Furnish at least one of each type.
2. Globes and Guards: 5% of each type and rating installed. Furnish at least one of each type.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver luminaires individually wrapped in factory fabricated fiberboard type containers.

B. Handle luminaires carefully to prevent breakage, denting and scouring of the luminaire finish.

C. Store product in a clean, dry space, protected from weather.

1.9 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authorities Having Jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

D. Designated manufacturers are listed to define the requirements for quality and function of the specified product.

1.10 WARRANTY

A. General Warranty: Special warranty specified in this Section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by this Contractor under requirements of the Contract Documents.

B. Special Warranty for LEDs' and Drivers: Manufacturers standard form in which manufacturer of LED's and drivers agrees to replace components that fails in materials or workmanship within specified warranty period.

1. LED arrays: 5 years from date of substantial completion.
2. Drivers: 5 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products as listed in the Lighting Fixture Schedule or comparable products approved in writing by Owner.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES AND COMPONENTS

A. Recessed Luminaires: Comply with NEMA LE 4 for ceiling compatibility for recessed luminaires.

B. Luminaires: Comply with UL 1598.

C. Metal Parts: Free of burrs, sharp corners and edges. Metal work shall be free of tool marks and dents and shall have accurate angles bent as sharply as compatible with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All miters shall be in accurate alignment with abutting intersection members.

D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging. Luminaires to be painted after fabrication. Finish ferrous mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.

E. Luminaire hardware to comply with the following material standards: For steel and aluminum luminaires, all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel luminaires, all hardware shall be stainless steel.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Safety devices shall be detachable if necessary and shall not interfere with luminaire performance, maintenance or the seating of any luminaire element. Safety device shall not be visible during normal luminaire operation and from normal viewing angles.

G. Luminaires provided shall have means for disconnection from power source during service, as required in NEC Article 410.

H. Reflecting Surfaces: Minimum reflectance as follows, unless indicated otherwise:

1. White Surfaces: 85%

2. Specular Surfaces: 90%
3. Diffusing Specular Surfaces: 75%

I. Lenses, Covers, Diffusers and Globes:

1. Glass: Annealed crystal glass unless otherwise indicated.

J. Adjustable luminaires shall have positive locking devices to fix aiming angle. Luminaires shall be capable of being relamped without adjusting aiming angle.

K. Each luminaire that has a lamp with an oval shape beam pattern or a spread lens that defines beam orientation shall contain lamp or lens locking devices to insure that lamp or lens orientation is not disturbed during lamp replacement or cleaning.

L. All luminaires and drivers shall operate within the temperature limits of their design and as specified by UL in the applications and mounting conditions specified.

1. Operating Temperature: Each luminaire shall be capable of operating above 105 deg F (37 deg C), but not expected to comply with photometric requirements at elevated temperatures.

M. For weatherproof or vaportight installations, painted finishes of luminaires and accessories shall be weather resistant enamel using proper primers or galvanized and bonded epoxy, so that the entire assembly is completely corrosion resistant for the service intended. Exterior finishes shall have an outdoor life expectancy of not less than 20 years without any visible rust or corrosion. Where aluminum parts come in contact with bronze or steel parts, apply a coating material to both surfaces to prevent corrosion.

N. Luminaires for use outdoors or in areas designated as damp locations shall be suitable gasketed to prevent the entrance of moisture. Provide approved wire mesh screens for ventilation openings. Dissimilar metals shall be separated by non-conductive material to prevent galvanic action.

O. Factory-Applied Labels: Comply with UL 1598. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

P. Luminaires shall be free of light leaks while providing sufficient ventilation of LED's and drivers to provide the required photometric performance.

Q. Luminaires shall hold LED arrays securely against normal vibration and maintenance handling.

2.3 LUMINAIRES

A. Housing shall be minimum code gauge steel construction painted after fabrication with high reflectance white paint unless otherwise indicated.

B. Shielding shall adhere to the following criteria:

1. Flat clear lenses shall be clear tempered glass.
2. For lenses with convex pattern of prisms or cones, specified minimum thickness refers to distance from the flat surface to the base of the pyramids or cones, or to the thickness of undisturbed material. For lenses with concave pattern, specified minimum thickness refers to overall thickness of the material. Lenses shall fully eliminate lamp image when viewed from all directions between 45-90 degrees from vertical. From 0-45 degrees the ratio of maximum brightness to minimum brightness shall not exceed 3:1. Minimum thickness shall not be less than 0.125" with a minimum weight of 8 ounces per square foot.

C. Doorframes shall be supplied with concealed hinges and latches. Provide mitered corners with no gaps or light leaks.

2.4 LED LUMINAIRES AND DRIVERS

A. All Luminaires

1. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.
2. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.
3. Comply with In-Situ testing for more reliable results.
4. LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.
5. LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.
6. LED luminaires shall deliver a minimum of 80 lumens per watt.

    a. LED's shall be "Bin No. 1" quality.

7. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.
8. Luminaires shall have internal thermal protection.
9. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.
10. Color spatial uniformity shall be within .004 of CIE 1976 diagram.
11. Color maintenance over rated life shall be within .007 of CIE 1976.
12. Indoor luminaires shall have a minimum CRI of 80.

13. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management
14. LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.

B. Power Supplies and Drivers

1. Power Factor: 0.90 or higher
2. Maximum driver case temperature not to exceed driver manufacturer recommended in-situ operation.
3. Output operating frequency: 60Hz.
4. Interference: EMI and RFI compliant with FCC 47 CFR Part 15.
5. Total Harmonic Distortion Rating: 20% Maximum.
6. Meet electrical and thermal conditions as described in LM-80 Section 5.0.
7. Fully dimmable, 0 – 10 VDC standard.
8. Secondary Current: Confirm secondary current specified by individual luminaire manufacturers.
9. Compatibility of dimming switches: Certified by manufacturer for use with individually specified luminaire and individually specified control components.

2.5 LED ARRAYS

A. All LED's of the same type are to be provided by the same manufacturer.

B. Equip each luminaire with the proper LED array of the type shown or specified in the Luminaire Schedule

2.6 WIRING

A. All flexible cord wiring between luminaire components or to electrical receptacles and not in wireways shall have a minimum temperature rating of 105 degrees Celsius.

B. Cords shall be fitted with proper strain reliefs and watertight entries where required by application.

C. No internal wiring shall be visible at normal viewing angles.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Luminaires:

1. Set level, plumb, and square with walls, and secure according to manufacturers written instructions and approved submittal materials, unless otherwise indicated.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, and reinstall.

C. Remote Mounting of Drivers: Distance between the driver and fixture shall not exceed that recommended by manufacturer. Verify, with manufacturers, maximum distance between driver and luminaire.

D. Wire per requirements of branch circuit installation. Properly ground each luminaire.

E. Install luminaires with vent holes free of air blocking obstacles.

F. Wall mounted luminaires shall be supported from four-square outlet box plaster ring and from wall at non-feed end with two 1/4-inch toggle bolts for gypsum board walls or 1/4-inch bolts to pre-set inserts for concrete wall.

G. Luminaires shall not be secured to other Systems.

H. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 LUMINAIRES

A. Wall Mounted Type: Refer to manufacturers suggested installation requirements for pool luminaires.

3.3 LED LUMINAIRES

A. Adhere to manufacturers installation guidelines regarding proper thermal management.

3.4 CLEANING AND ADJUSTING

A. Remove protective plastic covers from luminaires and luminaire diffusers only after construction work, painting and clean-up are completed. Remove, clean, and reinstall all dirty lamps, reflectors and diffusers.

B. Clean luminaires internally and externally after installation.

C. Make final adjustment of aimable luminaires and adjustable light settings under the direction of the Architect and/or Lighting Designer during a scheduled period of time

prior to the completion of the Project, after normal business hours if required. Include all equipment and personnel expenses including overtime required for focusing.

D. Luminaires, reflectors, louvers and accessories which are damaged, blemished, or impregnated with fingerprints shall be replaced at this Contractor's expense. All finishes shall be unmarred upon Project completion.

3.5 FIELD QUALITY CONTROL

A. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

B. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

C. Replace all inoperable and burned out LED's at the end of construction prior to Cleveland Clinic occupancy.

D. Advance Notice: Give dates and times for field tests.

E. Provide instruments to make and record test results.

F. Malfunctioning Luminaires and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this Work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100